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ABSTRACT

An instrument used to assess educational environments for computers as new tools for teaching and learning was studied in grades 2, 3, and 4 of the Atlanta (Georgia) Public Schools (APS) in May 1990. The instrument contained 46 items indexing: (1) the immediate and expanded spaces for the computer stations; (2) the presence of software and manuals; (3) teacher practices; and (4) student perspectives. Items were constructed from a list of teacher proficiencies claimed as outcomes resulting from contracted teacher training provided by the software vendor. Data were collected by observers in randomly selected classrooms representing all elementary schools in the APS. Observations were attempted in 338 classrooms. Univariate statistics and norming analyses are presented for all items and selected transformations. Reliabilities and coefficients for the full scale and selected subscales are tabulated and discussed to give a picture of computer use in these elementary schools. The desired teacher proficiencies were not revealed by this study. Eighteen tables present study data. Appendix A presents the Observation Schedule for Computers in the Classroom Environment; and Appendix B is a 326-item list of observer comments. A 33-item list of references is included. (SLD)

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An Observation Schedule for Assessing Computer Technology Environments at Second, Third, and Fourth Grade Levels

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The basis for this article was Revision Number 1 of Report Number 1: OBSERVATION SCHEDULE FOR COMPUTERS IN THE CLASSROOM ENVIRONMENT to Atlanta Public Schools, dated September 17, 1990

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Abstract

This document reports on an instrument used to assess educational environments for computers as new tools for teaching and learning in the second, third, and fourth grade classrooms (n=338) of the Atlanta Public Schools in May 1990. The instrument contained 46 items indexing the immediate and expanded spaces for the computer stations, presence of software and manuals, teacher practices, and student perspectives. The items were constructed from a list of teacher proficiencies claimed as outcomes resulting from contracted training provided by the software vendor. Data were collected by observers entering randomly selected classrooms. All elementary schools in the district were represented. Univariates statistics and norming analyses are presented on all items and selected transformations. Reliablilities and coefficients of concordance for the full scale and selected sub-scales are tabulated and discussed. Also, summary conclusions are presented.

Introduction

One of the guiding motivations in writing the current report was development of a narrative establishing dependability and confirmability for the research process in the sense presented by Lincoln and Guba (1982). As such, this report is intended to satisfy criteria for educational auditing by establishing its supporting research process as one conformable to accepted standards of professional practice. Thus, this report can be substantiated from collected data, it can be traced through a maintained audit trail in the form of diskettes reflecting all elements of the decision process, and it matches statistical procedures to the problems addressed by logical development of inferences with sufficient documentation that an auditor should arrive at the same conclusions as were developed in the report. This report is intended to serve as the official certification of findings from the observation schedule phase of Consulting Research Services under Atlanta Public Schools Contract No. 010401. It is the first in a series of three reports, the second concerning responses of second, third, and fourth grade teachers to an instrument named "Computing Potential in Atlanta Public School Education," the third reporting on the **"LISREL Model for Evaluating JLC Impact on Atlanta Public Schools Systemwide Goals I, II and III."**

The current study is meant to be an exploratory study of classroom environments, each classroom having 3 networked computers as common fixtures. It is based on an instrument currently known as the **"Observation Schedule for Computers in the Classroom Environment"** (hereafter referred to simply as the Observation Schedule) designed, in part, from externally defined Josten's Learning Corporation (JLC) Teacher Proficiencies. The

instrument was designed to produce data that may be termed "naturalistic data." A memorandum from Cindy Owens/Carolyn Spears of Josten's Learning Corporation sent to Tracy Faulkner/Dr. Henry L. Cobbs of Atlanta Public Schools on October 6, 1989, was the starting point in developing content for the Observation Schedule. That memorandum listed Teacher Proficiencies that should characterize all Atlanta Public Schools (APS) teachers at the end of a training session they attended prior to the 1989-90 academic year. The seminar was conducted by staff from JLC. According to JLC, the teachers, having had such a seminar, would be able to:

1. Use several word processors, Bankstreet Writer and Children's Writing/Publishing.
2. Have a strong working knowledge of the computer and its parts.
3. Have an understanding of a local area network and how it functions.
4. Better understand the writing process.
5. Schedule use of technology throughout the instructional day.
6. Use the technology each day in every subject.
7. Use software in conjunction with basal texts.
8. Use software to enhance the reading, writing, math and language arts skills of students.
9. Trouble shoot minor computer problems.
10. Utilize whole language approach to teaching, writing and reading.
11. Use computer to teach science simulations.

12. Increase personal writing skills.

13. Use innovative teaching methods in reading, math, science, social studies, language arts and writing.

14. Systematically incorporate use of classroom resources.

15. Use text and graphic software to enhance children's writing skills.

Many of the items in the Observation Schedule (formerly termed Unobtrusive Measures in the Classroom Environment) instrument served as proxies for items from the foregoing list of proficiencies. The Observation Schedule guided a methodology for collecting detailed naturalistic data on contributions of the computer to instruction and children's compliance. Descriptive analyses of variables were undertaken to allow probability statements for instructional utilization and compliance. With such data the subsequent LISREL phase of the study would allow for exploration of the effects on systemwide objectives of environmental evidence from limited teacher and student self-reporting as well as from more objective observations of contributing APS Research Associates (RAs) and independent observers.

The Observation Schedule guided in place recording of data from observing classroom computer instructional environments, including some teacher claims for teaching practices and a reporting of student reactions to a set of guided questions concerning classroom practices. Clearly, the objective for the Observation Schedule was an environmental assessment for input to subsequent LISREL Modeling.

Toward realization of that objective, the writers in this report maximize use of naturalistic methods in descriptions, illustrations, hypotheses testing, and general assessments of level of computer support to attainment of published JLC teacher proficiencies. Support for those methods originated from germinal ideas described in books by Webb and others (1966, 1981) in combination with the already listed proficiencies specified by JLC. These guided drafting of the Observation Schedule. Suggestions of Research Associates employed by APS were incorporated in writing the second and third (final) drafts of the Unobtrusive Measures instrument. Two professional research associates representing themselves and their colleagues also contributed to the subsequent revision that was renamed as the Observation Schedule. The RAs, who were seasoned educators with varying numbers of years of experience, participated in group discussions critiquing the content of the original instrument and its drafts. Individual RAs provided feedback subsequent to its field use, and that feedback was the basis for the latest revision and renaming of the instrument. Demographically, some RAs were male, others were female; some were black, others were white.

The selection of evaluators was not without tension. Initially, the evaluation plan called for RA's only but timing became a problem. To augment RA efforts, a group of six independent evaluators was employed as two teams travelling separately to randomly selected elementary schools to more than double the number of classrooms in the sample. It is certainly true that the six independent evaluators introduced an obtrusive dimension that alone required renaming of the instrument as the Observation Schedule.

Hatch and Bondy (1986) wrote about implications for naturalistic studies in classrooms of the researcher-teacher relationship, considering it to be on a continuum. Because of potential differences between RA and non-RA evaluators, part of the data analysis design is based on statistical definition of the extent of those differences (a MANOVA design not reported here). A training session for each of the two teams of non-RAs was conducted to promote acceptable field relations between non-RA evaluators and teachers during the data collection phase. Biklen and Bogdan (1986) suggested need for discussions of such procedures for better field relations.

The Observation Schedule further represented a practitioner's view of computer environments based on much personal exposure in situations and schools outside of Atlanta by the instrument developers. From the sources contributing to its construction, one might capitalize on the view of Fetterman (1987) with characterization of the instrument as an "artistic" conception, as opposed to a science-based conception, intended as a background against which associations between pairs of related phenomena may manifest themselves under appropriate statistical analyses designed to detect associations. In a sense of the word, the instrument was designed to be phenomenological in detecting some of the qualitatively different ways teachers could structure the environments in which computers as teaching tools had been placed. The statistical treatments themselves were selected from analogy with other problems to which they could be unchallengingly applied. The methods are thereby balanced and comprehensive in scope.

More positivistic methods were not selected to avoid deeper intrusion into the sanctuary of the classroom. The instrument is void of deception and violates neither professional nor social ethics. It was designed to guide collection of data in public school classrooms available to parents, other educators, and administrators. The instrument should satisfy the criteria published by Lincoln and Guba (1987) in meeting approval of reasonable persons, in being non-negative if publicity should be generated by the study, and in being discrete in its level of intrusiveness. At all times the teachers were in charge while being observed. However, they made no decision regarding either the design or conduct of the observations.

The remainder of this report is organized to present the following:

1. A literature based rationale for naturalistic assessment of computing in the classroom.
2. The techniques used to adapt and present the data.
3. Statistical assessment procedures, with tabular presentations of the data generated by each.
4. Summary of Conclusions
5. References

Literature Based Rationale for Naturalistic Assessment

This section is subdivided into four sub-sections, each concerning a different dimension of the problem of naturalistic assessment. The first concerns external evaluation, the second is a general orientation to selected, relevant literature for the naturalistic/ unobtrusive/nonreactive approach, the third pertains to subclassifications for naturalistic observation, and the fourth to ethical principles and issues.

External Evaluation

Greene and others (1988) recommended external, qualitative, evaluation audits as viable meta-evaluative tools for assessing educational practice. The term audit here refers to program evaluation, not to evaluation of evaluation as it is used in other contexts. Furthermore, there are precedents for utilizing naturalistic methods for evaluation of large-scale instructional projects.

Shrock (1985), in comparing naturalistic inquiry with experimentalism, defended use of naturalistic inquiry in selected situations while at the same time raising issues and questions about the methodology. The current methodology is sound for measuring some of the JLC teacher proficiencies.

Kennedy (1984) raised questions about presence of ambiguities in the use of qualitative data. The current study differs from Kennedy's, however, in that Kennedy worked with testimony. Nevertheless, her concerns are addressed in subsequent sections through ample justification of the conclusions drawn by basing those conclusions on generally acceptable rules of evidence beginning with the observed data.

Welch (1983) recommended both naturalistic and experimental inquiry methods in educational research and evaluation. Ultimately, the current APS project utilizes both. The current report presents evidence from the naturalistic side. A later report will treat the experimental side for data collected from an opinionnaire ("Computing Potential in Atlanta Public School Education") subsequently distributed to all second, third, and fourth grade teachers in APS at the end of the 1989-90 academic year. In fact, the processes globally undertaken for this evaluation project promote methodological rigor as defined by Owens (1982): The APS project applies concurrent, though not simultaneous, data collection and analysis procedures with both naturalistic and rationalistic data; the APS project ultimately leaves an audit trail; it relies on multiple sources of evidence; and it employs detailed description of procedures, results, and conclusions. In fact, current activities will continue with reports affording interested groups access to the process of interpretation as advocated by Kushner and Norris (1980-81). The data for the study were generated, however, under guidance of hypotheses based on assumptions about environmental characteristics of classrooms in which computers contribute to instruction. Data generated under guidance of hypotheses in this way, rather than being hypothesis generating as some authors claim characterize naturalistic inquiry, suggest the possibility that the naturalistic inquiry terminology may be a slightly inaccurate misnomer (Tikunoff and Ward, 1980) in the APS application of the methodology.

Jacobs (198_) takes a more generalized view of naturalistic inquiry referring to it as a paradigm associated with little prior manipulation or control of the variables and with few

constraints imposed on the outcomes. In this sense the terminology in the APS application is accurate. Jacobs further identifies naturalistic inquiry with instruments classified as qualitative in nature. The Observation Schedule guiding data collection was qualitative for many items in requiring observers to indicate dichotomous presence or absence only. For other items, recoding and statistical treatment assumed ordinality in the data in certain ranges of the item scales; and in other instances the data were interval in character.

Relevant Literature for the Naturalistic/ Unobtrusive/ Nonreactive Approach

This report is shown in the foregoing to be based on a naturalistic methodology--an emergent design that is useful for studies having at the outset a somewhat vague definition of issues. The LISREL model for exploring the match between objectives and performance of second, third, and fourth graders enrolled in 1989-90 in APS calls for a JLC component involving manifest variables associated with teachers and students. Anticipated data for these variables were not collected for reasons beyond the investigators' control. A part of the challenge for the current report, then, is to clarify the school/ classroom/ instructional environment data issue as much as possible by extracting maximum information from the Observation Schedule data to paint a reasonable picture for the degree to which computing was being used as an instructional tool at the end of the 1989-90 academic year, and to illustrate some of the salient sources of variance in environmental practice. Finally, environmental data calculated from considerations developed in this report will substitute for other (unavailable) data called for in the LISREL Model.

Procedures employed for defining and assessing the local classroom environment for developing computer supported instructional objectives were based on an eclectic paradigm for naturalistic evaluation. Although theory for the design is emergent, it has a history. Freda, as long ago as 1978, applied nonreactive measuring to both teachers and students in the process of studying school improvement variables involving instructional methods and categorized further as being attitudinal.

Hatch (1985) defined naturalistic inquiry to include participant observation, interviewing, and unobtrusive methods. By that definition, production of the Observation Schedule and collection of data with the RAs and independent observers (including brief interview interactions with the teachers) qualifies the process as a naturalistic inquiry. Neuman (1989), in describing a naturalistic paradigm or qualitative approach for studying effectiveness of computer based instruction, was an advocate of an unobtrusive or nonreactive measures approach similar to the approach used here.

Tabachnick (1989) advocated qualitative (naturalistic) research methods that were culturally responsive for understanding processes of teaching, learning, and schooling. The Observation Schedule was designed for lay understanding, its items do not require a highly technical orientation to computing for enlightened judgment.

On the other hand, House (1988) described a recurring problem with naturalistic sampling of children: the problem of reactivity that manifested itself in side-effects. The children sampled in each classroom for the current study were selected randomly from a scheme accompanying each Observation Schedule. That scheme was based on numbering a

priori natural groupings of the children in each classroom and designing a second scheme for numbering within each natural grouping. Two random numbers respectively were selected to specify each of the three children to be interviewed in each classroom: the first random number designated the specific natural grouping, the second number designated the specific child within the natural grouping. Complete, accompanying instructions guided use of the random number table with respect to entry and movement within the table.

Other investigators have also applied naturalistic methods for assessing learning of subject matter (meeting educational objectives) from computer aided practice. Hativa (1986) used naturalistic methods to investigate contributions of computer assisted instruction to learning of arithmetic in Israel. As in the APS case, Hativa wanted to understand the holistic environment in which computing was set.

Williams (1986) addressed the utility of naturalistic inquiry in educational situations. Although his sixteen questions about the situation were not addressed, a priori, the use of the process in the current APS situation for assessing the environmental contribution of the computer to student attainment of APS objectives were deemed appropriate.

Subclassifications for Naturalistic Observation

Lincoln and Guba (1988), who are considered by many educators as the parents of naturalistic inquiry, presented 8 criterial sets for assessing naturalistic inquiry, namely: (a) foundational, (b) non-foundational, (c) trustworthiness (d) axiomatic, (e) rhetorical, (f) action, (g) application/ transferability, and (h) product. It is not claimed that the Observation

Schedule satisfies each criterion set, rather it satisfies only those criteria relevant to this investigation.

Guba (1987) in an earlier report, on the other hand, presented but two forms of naturalistic evaluation: (a) qualitative techniques complimentary with conventional methods, and (b) a more complex paradigm emphasizing multiple social realities. The former compares with methods selected for analyzing data collected with the Observation Schedule in APS classrooms, the later is more akin to methods envisioned for subsequent LISREL analyses of a wider collection of data including the Observation Schedule data as but one component. Conclusions drawn from the LISREL data would apply in a general sense to program evaluation. Such an approach is not without precedent: Pearsol (1987), for example, edited seven papers containing conclusion justifying criteria for naturalistic observation as a tool for program evaluation. However, the transition between naturalistic procedures and evaluated outcomes may generate potential theoretical conflicts (Williams, 1986). Care was taken, therefore, for subsequent sections of this report to develop a rationale in each case for applying the statistical methodologies and for drawing the subsequent conclusions arising from them.

In an earlier report, Lincoln and Guba (1986) suggested trustworthiness and authenticity as two criteria for rigor in applying the naturalistic paradigm. In the present case, trustworthiness is addressed in the section on reliability; and authenticity is justified first by the environments measured, then by the existence of an instrument to guide the measurements.

Yoong (1986) interpreted Lincoln and Guba's criteria of authenticity as having five properties. The first was fairness; the second was ontological authenticity, or the possibility to improve experience; the third was educational authenticity, or the possibility to increase understanding; the fourth was catalytic authenticity, or the potential to be facilitative and simulative of action; and the fifth was tactical authenticity or a potential ability to act toward change. Lincoln (1986) developed "fairness" to reflect a proper balance between harm and good as one of five amplifying criteria.

Ethical Principles and Issues

One common concern in the literature of naturalistic inquiry addresses ethical principles and issues (Grover and Uguroglu, 1984). Consideration of that concern also demanded openness of the process and contributed to a renaming of the instrument removing the word "Unobtrusive." There was no APS review committee to certify respect of the process for privacy, and none was needed because the process was openly one of gathering data on the extent of computer use in the public setting of each classroom.

Ortiz (1983) examined the ethicalness of unobtrusive inquiry from the point of view of public use of the data finding probable increase in necessary ethical considerations with increase in public use. It is the writers' opinion that ethical standards have been maintained although the circumstances were at times ambiguous, changeable, and fluid.

The Techniques Used to Adapt and Present the Data

Halpern (1983) developed recommendations for auditing naturalistic inquiry. The auditor-reviewer should assess extent of grounding of the research findings and conclusions in the raw data through application of appropriate, historically-accepted, analytic conventions. In each derived judgement that follows for the Observation Schedule, a rationale is supplied for linking data to conclusion through established analytic conventions.

Statistical Assessment Procedures, with Tabular Presentations of the Data Generated by Each

A copy of the Observation Schedule for Computers in the Classroom Environment (the Observation Schedule) is attached as Appendix A. A general commentary about data collected under use of the Observation Schedule is presented in the first sub-section that follows. This statistical assessment section is then further sub-sectioned according to statistics applied to the Observation Schedule data into the following sub-topics: (a) Univariate statistics for items and item transformations, (b) univariate statistics for scales computed from items and item transformations, (c) observer comments, and reliabilities for scales and coefficients of concordance for scale components. Some of the foregoing sub-sections are again subdivided by paragraph headings for further organizational control. Factor analyses of items composing the separate scales and MANOVAs for grade level and the RA vs Non-RA dichotomy are to be presented in a later report/ article now being developed.

Selected Breakdowns of the Data

Observations were attempted in three hundred thirty-eight classrooms. Not all of the attempts were successful because of circumstances beyond control of the observers, a problem that is further considered in the sub-section on observer comments.

In this sub-section concern is with representativeness of the data with respect to the actual elementary schools observed, the grade levels and sections observed, and the distribution of observations by observer. Table 1, frequencies of observations in elementary schools in ascending order of school codes, contains 84 entries, 1 more than the number (83) of elementary schools in the Atlanta Public School System. A double entry for Harris seems to explain this inconsistency.

Table 1

Frequencies of Observations in Elementary Schools in Ascending Order of School Codes

Elementary School	School Code	Frequency	Elementary School	School Code	Frequency
Adamsville	41007	3	Hubert	42434	9
Anderson Park	41014	6	Humphries	42441	3
Arkwright	41028	3	Kirkwood	42504	9
Beecher Hills	41042	3	Lakewood	42511	3
Ben Hill	41049	1	Lin	42518	6
Capital View	41133	4	McGill	42532	3
Cascade	41161	3	Peterson	42616	3
Collier Heights	41203	6	Slater	42700	4
Connally	41210	3	Slaton	42707	6
Continental Colony	41217	6	Stanton, D. H.	42734	2
Dunbar	41259	6	Thomasville	42777	3
Fain	41287	3	Toomer	42784	9
Fickett	41294	3	Waters	42833	6
Gideons	41329	1	West	42841	3
Harris	41385	1	Whitefoord	42875	3
Harris?????	40385	6	Bethune	43063	6
Harwell	41392	3	Blalock	43077	3
Hutchinson	41448	3	Boyd	43084	3
Kimberly	41490	3	Brandon	43091	3
Miles	41539	3	Carey	43140	3
Perkerson	41609	6	Carter	43147	5
Peyton Forest	41623	6	Cook	43224	3
Ragsdale	41658	6	English Avenue	43280	3
Rusk	41686	3	Fowler	43301	3
Stanton, F. L.	41742	3	Garden Hills	43315	6
Sylvan Hills	41763	3	Grove Park	43357	3
Venetian	41805	6	Herndon	43399	3
West Atlanta	41847	6	Hill	43406	5
West Manor	41861	3	Hope	43420	3
White	41868	4	Jackson	43462	3
Wright	41896	3	Jones, M. A.	43476	3
Benteen	42056	7	Mitchell	43546	6
Blair Village	42070	5	Morningside	43560	3
Brewer	42098	3	Oglethorpe	43588	3
Burgess	42119	3	Pitts	43630	6
Campbell	42126	3	Rivers	43672	3
Cleveland	42189	3	Scott	43693	3
Dobbs	42238	6	Smith	43721	3
Drew	42252	3	Towns	43791	3
East Lake	42273	3	Williams	43882	3
Gordon	42336	8	Woodson	43889	6
Guice	42364	3			
Howell	42427			Total:	338
Valid Cases:		338	Missing Cases:		0

Table 2, frequencies for observations by grade level, by section, and by observer, reflects similar levels of representation for second, third, and fourth grade teachers.

Observations were about equally divided by grade level. RAs made 158 observations and the independent observers made 180.

Table 2

Frequencies for Observations by Grade Level, by Section, and by Observer

Grade	Freq.	Percent	Section	Freq.	Percent	Observer	Freq.	Percent
2	111	32.8	0	30	8.9	An APS RA	158	46.7
3	118	34.9	1	140	41.4	Independent Observer 1	32	9.5
4	109	32.2	2	99	29.3	Independent Observer 2	30	8.9
Total	338	100.0	3	53	15.7	Independent Observer 3	31	9.2
			4	13	3.8	Independent Observer 4	30	8.9
			5	3	.9	Independent Observer 5	31	9.2
			Total:	338	100.0	Independent Observer 6	26	7.7
						Total:	338	100.0
Valid Cases: 338 Missing Cases: 0			Valid Cases: 338 Missing Cases: 0			Valid Cases: 338 Missing Cases: 0		

Univariate Statistics for Items And Item Transformations

It was not possible in this sub-section to present the data in the precise sequential order of items in the Observation Schedule. However, item sequencing was followed to a degree controlled by similarity in their response patterns. Examination of the instrument in Appendix A shows that some of the items were dichotomous, others requested responses on the continuum between 0 and 100, others were open-ended, and others were scaled by months or days in the month or by arbitrary ordinality. The presentation, then, is controlled as much as possible with sequences of similarly coded items treated in an order that approximates closely the order of the items in the instrument, with related digressions into theoretical transformations developed in context.

Table 3 addresses response frequencies, means and standard deviations, and tests of binomial assumptions on proportions of No response values for items 1 through 10. The columns of response values present both absolute observed frequencies and relative frequencies in the form of percentages. The columns for univariate statistics present means and standard deviations for the dichotomous 1 and 2 values used for coding the negative (No) and affirmative (Yes) responses respectively. The means and standard deviations are important subsequently as background for reliabilities and as indicators of needed transformations.

Table 3

Response Frequencies, Means and Standard Deviations, and Tests of Binomial Assumptions on Proportions of No Response Values For Items 1 Through 10

Item No.	ABBR Statement	Response Values		Univar Statement		Binomial	
		1=No/%	2=Yes/%	Mean	STD	Test	PRintails
1	Computers on?	106/31.4	232/68.6	1.686	0.465	.10 .50	.0000 .0000
2	Manual Storage?	97/28.7	241.71.3	1.713	0.453	.10 .50	.0000 .0000
3	Computer desks?	297/87.9	41/12.1	1.121	0.327	.90	.2245
4	Chair every station?	57/16.9	281/83.1	1.831	0.375	.10 .50	.0000 .0000
5	View of screens?	321/95.0	17/5.0	1.050	0.219	.90	.0031
6	Visible fingerprints?	119/35.2	219/64.8	1.648	0.478	.10 .50	.0000 .0000
7	Comp accessibility?	32/9.5	306/90.5	1.905	0.293	.10	.8137
8	For non-computer?	246/72.8	92/17.2	1.272	0.446	.50 .90	.0000 .0000
9	Page edges dirty?	202/59.8	136/40.2	1.402	0.491	.50 .90	.0004 .0000
10	Dirt, marks, etc?	239/70.7	99/29.3	1.293	0.456	.50 .90	.0000 .0000

Note: PRintails is probability under the two tails.

The rightmost major heading in Table 3 presents data for evaluating the assumption that the No and Yes responses were made by chance, at probabilities specified under the "TEST" column. If the hypothesis of chance (test proportion of 0.50) is rejected, there is an additional hypothesis tested, either the hypothesis that (a) the Yeses predominated (Noes are in assumed proportion of 0.10), or (b) the Noes predominated (Noes are in assumed

proportion of 0.90). The column labeled "TEST," therefore, contains data specifying the assumed proportion that was evaluated in each case against the actual numbers of Noes and Yeses observed.

For example, for the first entry into the table for Item 1 "Are the computers turned on?" the percentage of Noes was 31.4 and of Yeses was 68.6. If one assumes the current sample to be a random sample of all second, third, and fourth grade classrooms (a reasonable assumption), one is in the position to test hypotheses about the on/off status for the larger population. One is restrained somewhat in that each tested hypothesis must be formulated to be in correspondence with the exact hypothesis SPSS was programmed to test. SPSS is programmed to assign hypothesized proportions to the lesser of the two binomial values, in this case to the Noes because all Noes were coded with ones and all Yeses with twos. Thus, for Item 1 SPSS was directed to test the hypotheses that (a) 10% of the computers in the population would be off at the time of observer arrival in the classroom, and (b) 50% would be off.

Two binomial tests were applied to these observations to test the two assumptions: the first being that ten percent (with equivalent proportion equal to 0.10) were turned off, the second being that 50 percent (equivalent proportion of 0.50) were off. The right most column of the table headed PRintails contains probabilities in the two tails under the binomial distribution for testing the respective hypotheses against the observations. Since both probabilities are recorded as 0.0000 one is compelled by the evidence to reject both of the tested hypotheses. That is, one rejects both that 10% would be off and that 50% would be

off. Now it is important to note the percentage of Noes reported for the sample observed: 31.4%, a number lying on the interval between 10% and 50%, the two percentages equivalent to the proportions tested. One, thereby is led to the loose conclusion that in the population the true percentage of off computers is larger than 10% and smaller than 50%.

The astute, statistically oriented reader should quickly note that confidence interval analysis of the data would allow estimation of the most likely limits containing the true population proportion at specified levels of confidence. The more detailed analyses were not computed for a number of reasons: (a) the data for each item were entered into reliability, concordance calculations reported in later sub-sections (and in factor analytic calculations to be reported in a later article); (b) the responses for each item need a more complete contextual development for its contribution to the classroom environment the instrument was constructed to measure or index, and (c) SPSS was not programmed to do confidence interval estimation.

Conclusions (for findings presented in Table 3) drawn for individual items on the Observation Schedule itself are listed with an additional classification as being either support (S) or use (U) items in the following paragraphs:

1. (U) Between 10% and 50% of the computers in second, third, and fourth grade APS classrooms will be turned off during any unannounced observation in the weeks prior to the end of the school year.
2. (S) Between 10% and 50% of the storage areas for relevant computer manuals in APS 2nd, 3rd, and 4th grade classrooms will not be within reach of students.

3. (U) No dust will be obvious on computer desks in about 90% of the classrooms. Another way of making the statement is that about 10% of the classrooms will contain computer desks so little used that there will be perceptible dust on them.

4. (S) In more than 10% of the classrooms computer stations will not be equipped with enough chairs to facilitate use of each station.

5. (S) Viewing of the computer stations will be blocked in fewer than 10% of the classrooms.

6. (U) In between 10% and 50% of the classrooms, computer screens will show visible fingerprints. One cannot judge without more evidence the reason for this, whether the children had been too restrained while using the computers, the custodians or teachers had been too fastidious or too facetious, or the phenomenon had another cause. But, fingerprinting is usual.

7. (U) The observed data do not permit rejecting the hypothesis that in 10% of second, third, and fourth grade APS classrooms the furniture will be placed in positions not allowing reasonable computer accessibility.

8. (U) Between 50% and 90% of the classrooms presented no evidence that used computer paper was being salvaged for non-computer purposes. This may indicate that paper resources were available in sufficient quantities that a second use (backsides) for computer paper was unwarranted. It

may also indicate that not much paper was passing through the printer, or that the paper that passed through was being sent home.

9. (U) Between 50% and 90% of the software manuals maintained at the work stations had no perceptible use if use was indicated by dirty page edges.

10. (U) Further indication of lack of use was absence of dirt smudges, finger marks, highlightings or underlinings on the pages of software manuals in between 50% and 90% of the classrooms.

If one interprets the foregoing independently, one may arrive at the conclusions presented, or, perhaps at other conclusions. For example, the absence of dirty edges on, or use marks within, the software manuals may be interpreted to indicate that the teachers are teaching so well how the software should be used that the students need make no reference to the software manuals. One could also reason that children as young as second graders are incapable of using the manuals. However, if one combines evidence from groups of items into indexing scales, one can obtain a better indication. Scales based on a combination of items were computed and normed. Reliabilities are reported for the scales are developed in following sections.

Table 4 presents univariate means and standard deviations, and tests of normal distribution assumptions for observed frequencies of response values for items 11 through 15. One notices immediately that the sub-headings in the center of the table represent observed percentages that have been divided by 10. This was done, in this case, as a presentational consideration so the table would fit on an 8.5 inch wide sheet of paper.

Table 4

Univariate Means and Standard Deviations, and Tests of Normal Distribution Assumptions for Observed Frequencies of Response Values for Items 11 through 15

Item	Response Values ÷ 10											UNIVAR STAT		K-S GOF to Normal	
	0	1	2	3	4	5	6	7	8	9	10	Mean	Std	K-S Z	2-tail Prob
11	206	70	17	15	7	13	3	2	5			9.290	16.74	5.883	.000
12	196	87	29	9	5	12						7.456	11.89	5.784	.000
13	203	58	25	17	3	12	5	7	7		1	11.12	19.73	5.776	.000
14	219	69	24	7	5	8	1	2	1	1	1	7.249	14.51	6.237	.000
15	167	73	35	12	6	17	3	7	9	5	1	15.15	23.74	5.440	.000

The numbers in the cells of Table 4 with "Response Values ÷ 10" across their top represent numbers of observations for associated row-column conditions. For example, the 206 on the row beginning (stubbed) with the number 11 and in the column topped (headed) with the number 0 indicates 206 observations were made of second, third, and fourth grade APS classrooms that were without (the 0 heading) instructional display space on bulletin boards dedicated to commercial or teacher-produced computing related topics (the item stubbed with the 11).

Numbers in the portion of Table 4 in columns under "UNIVAR STAT" designate two univariate statistics, the item mean and standard deviation, computed for the item stubbed by the number in the row at the leftmost column. All observations of second, third, and fourth grade APS classrooms, for example, for item 11--the amount of instructional display space on bulletin boards dedicated to commercial or teacher-produced computing related topics--had a mean of 9.29% and a standard deviation of 16.74. The mean here represents the typical

amount of dedicated bulletin board space, the standard deviation indexes the observed variation (atypicalness) of the mean by communicating, in a summarizing manner, the level of dispersion or clustering of all observations about the mean.

The data in Table 4 under "K-S GOF to Normal" (Kolmogorov-Smirnov Goodness of Fit to the Normal Distribution) are numbers communicating information about the shape of the distribution between its lowest and highest values. The numbers are outcomes for testing the hypothesis that the distribution on each row differs only by chance from a normal distribution. The "K-S Z" (Kolmogorov-Smirnov Z Score) column contains the standardized score z value associated with the maximum deviation of the observed distribution from a normal distribution parameterized with the observed mean and standard deviation. The larger the value of "K-S Z" the greater the deviation of the observed distribution from the hypothesized distribution. The set of zero values under the "2-tail Prob" (2-tailed Probability) column indicates that the hypothesized chance deviation must be rejected in every row.

A complete examination of Table 4 leads one to conclude that observations made of second, third, and fourth grade APS classrooms indicate a dominant lack of display of computing related materials on spaces usually considered optimal for display. The clustering of observations at low values, in combination with observed values for Kolmogorov-Smirnov Goodness of Fit ("K-S GOF") statistics suggest the phenomenon is systemic in APS classrooms at the grade levels measured.

The data also suggest that teachers are receiving only limited benefits, compared with potential benefits, from the computing power at their disposal for production of worksheets and handouts (Item 15). On the average, only about 15% of the opportunities were reported to have been capitalized upon.

A comparison of Tables 3 and 4 reveals broad differences in means and standard deviations. However, the Observation Schedule was meant to provide a number of environmental indicators for computing in APS classrooms. Moreover, ultimate needs for the data in LISREL modeling suggest the necessity for transformations such that the differences in scale do not dominate analytic outcomes. The researchers were left with two possibilities: (a) to expand the scale of the first ten items to match items 11 through 15, or (b) to reduce the scales of items 11 through 15 to approximate the properties of the scales for the first 10.

The procedure of choice in the present case was to compress the scales of items 11 through 15. (This principle was followed for alignment of scales in all analytic phases.) Since a scale of percentages can range from 0 through 100 and since the scales chosen for the Noes and Yeses of Items 1 through 10 ranged between 1 and 2, the most logical first approximation would be division of the percentage scales by 50. However, 0 ÷ by 50 is still 0, and many display spaces were recorded as empty. The logical second step, then, would be to add 1 to each value after dividing by 50. Of course, adding 1 should shove other values beyond the targeted maximum of 2. What was then needed was a rescaling algorithm that would shrink higher values without too much disturbing lower values: the chosen transformation therefore was the logarithm to the base 10.

Table 5

Statistical Tests of Goodness of Fit to the Normal Distribution of Three Transformations on Items 11 Through 15

Item	Values ÷ 50 ***				(Values ÷50) + 1 **				Logarithm to Base 10 *			
	K-S Goodness of Fit to Normal				K-S Goodness of Fit to Normal				K-S Goodness of Fit to Normal			
	Mean	STD	K-S Z	Prob	Mean	STD	K-S Z	Prob	Mean	STD	K-S Z	Prob
11	.4905	.2412	6.457	.000	1.490	.2412	6.457	.000	1.040	.2595	6.946	.000
12	.7823	.3668	6.603	.000	1.782	.3668	6.603	.000	1.014	.2056	6.709	.000
13	.8268	.4506	6.737	.000	1.827	.4506	6.737	.000	1.067	.2900	6.685	.000
14	.7485	.3759	7.237	.000	1.748	.3759	7.237	.000	1.008	.2207	6.728	.000
15	1.070	.3619	5.263	.000					1.119	.3268	6.474	.000

Note: *** Corrects to the range of 0 to 2
** Increases the minimum to 1 and shoves the maximum beyond 2
* Reduces higher values without disturbing too much the smaller

Perhaps more should be written here concerning the logarithmic (to the base 10) transformations. With such a transformation methodology, one searches for powers to which the base of 10 would be raised to produce the number transformed. From the following schematic one notices that the percentages observed become dampened on the logarithmic scale such that if statistical computations should be based on their logarithmic values rather than on the observed percentages the relative weightings in comparison to the 1's and 2's of the first 10 items on the Observation Schedule are much more comparable. In other words, displays everywhere on all the bulletin board space called for by item 11 and recorded with 100, get transformed to a 2 thereby becoming exactly comparable to a Yes response for having the computers turned on for item 1.

Number Transformations	Power of 10	Number Transformations	Power of 10	Number Transformations	Power of 10
0	Undefined				
1	0.0000	10	1.0000	100	2.0000
2	0.3010	20	1.3010	200	2.3010
3	0.4771	30	1.4771	300	2.4771
4	0.6021	40	1.6021	400	2.6021
5	0.6990	50	1.6990	500	2.6990
6	0.7782	60	1.7782	600	2.7782
7	0.8451	70	1.8451	700	2.8451
8	0.9031	80	1.9031	800	2.9031
9	0.9542	90	1.9542	900	2.9542
10	1.0000	100	2.0000	1000	3.0000
11	1.0414				
.					
.					
.					
100	2.0000				
.					
.					
.					
1000	3.000				
.					

Comparisons of the logarithms for numbers between, say, 11 and 0 lead to a dilemma needing consideration. The dilemma concerns what to do with those classroom observations having zero's recorded for items 11 through 15. A closer look suggests that in the logarithmic sense, having 10% display space (transformation coded as 1.0000) carries the same value as a No for having the computers turned off. How much worse than having 10% should one consider having no display space whatever dedicated to commercial or teacher-produced computing related topics (item 11)? The reader must recognize that this becomes a judgment call! Because the task of the observers to be accurate here was difficult at best and

because low numbers from the observers were actually coded as 10's for analysis, the researcher arbitrarily assigned the value of 0.9000 as the logarithmic transformation for observed values of zero for items 11 through 15. In essence, this is equivalent to judging no difference between no space and 8% space. It is to judge further that the instructional difference between environments having 8% and 0% space is practically and theoretically irrelevant, and that beyond about 8% display space, differences become meaningful. Three times as much credibility is given by the logarithms to movements between 10% and 20% display space, about two times as much between 20% and 30%, about one and one-half times between 30% and 40%, and about the same credibility to differences between 40% and 50%. The numbers say further that it is double as serious to move from 10% to 0% display space as it is to move from 100% to 90%. It should be noted from the foregoing discussion that the logarithmic transformation would prevent domination of the very few observed high scores on items 11 through 15 in later decision algorithms.

In evaluating the statistical tests of goodness of fit to the normal distribution of the three described transformations on items 11 through 15 presented in Table 5, the reader is urged to draw upon the foregoing considerations,

From Table 5 one observes that the transformations of the second and third algorithms in the middle and right columns produce better alignment to statistical outcomes of items 1 thru 10 than the algorithm in the left column. One further observes the need to reject any notions that the transformed distributions have assumed normal properties. Additional

evidence, subsequently presented, will permit a better decision on which of the two more acceptable transformations should be chosen for retention into the LISREL analyses.

It was reasoned during developmental phases of the Observation Schedule that another variable indexing environmental quality for computer use would be number of software kits in the classroom. The wide range observed for this variable, however, was completely unexpected. In fact, in the coding algorithm for the variable, only 3 digits were allocated permitting numbers as large as 999. In one classroom, there stood 10, 10 inch long diskette boxes, all full of software. In a number of classrooms there were 4 such boxes. More common were one or two boxes. At the other extreme, there were classrooms without relevant software. The analyst, thus, needed to bring discipline to the data to prevent this one variable from overwhelming subsequent analyses. Under logic similar to that presented in the foregoing (for items 11 through 15) three transformations were applied.

The first was merely a renaming of the variable to the name "No. Kits," the second was division of the observed values by 250 then adding 1, and the third was a logarithmic transformation to the base 10 of the observed values. Examination of the Table 6 presentation of descriptive statistics for item 16 scales having more than 30 distinct values, suggests initial acceptability (from criteria of having similar mean and standard deviation to items 1 through 10) for both the shifted transformation, SPSS coded as

COMPUTE STRAN016 = 1 + ITEM016/250

and the logarithmic transformation SPSS coded as

COMPUTE LOG016 = LG10(ITEM016).

Observed values of zero for item 16 were assigned as 0.09 to LOG016.

Table 6: Descriptive Statistics for Item016 Scales Having More Than 30 Distinct Values

Scale	Mean	Std Dev	Percentile					K-S GOF to Normal	
			10	25	50	75	99	K-S Z	2-tailed P
Observed No. Kits	121.4	267.						7.264	.000
STRANO16	121.4	267.						7.264	.000
LOGO16	1.485	1.07						7.264	.000
	1.173	.876						2.258	.000

It was therefore considered about eight times more serious to have no relevant software than to have no display space on the bulletin boards dedicated to computing related topics. Again, this was a subjective judgment swayed, in part, by the desire to have distribution statistics for transformations of item 16 be somewhat comparable to similar statistics on items 1 through 10.

No data are presented in the space of Table 6 meant to contain percentile values. These data were omitted because there were so many classrooms having small values that their inclusion would communicate little.

There is redundancy between Tables 6 and 7. The latter presents statistical tests of goodness of fit to the normal distribution of item 16 observed values and its two transformations.

Table 7

Statistical Tests of Goodness of Fit to the Normal Distribution of Item 16 Observed Values and Two Transformations

Observed Values				(Values ÷ 250) + 1				Logarithm to Base 10			
K-S Goodness of Fit to Normal				K-S Goodness of Fit to Normal				K-S Goodness of Fit to Normal			
Mean	Std	K-S Z	Prob	Mean	Std	K-S Z	Prob	Mean	Std	K-S Z	Prob
121.4	267.5	7.264	.000	1.485	1.070	7.264	.000	1.173	0.876	2.258	.000

Discounting provision for presentation of percentiles, both tables contain the same information. Table 6 remains in the report to suggest caution due to likely limited value for the data it represents. Should those limitations actually exist, they should be observed in the reliability sub-section presented later and in subsequent factor analyses.

Table 8 contains response frequencies, means and standard deviations, and tests of binomial assumptions on proportions of No response values for items 17 through 25 and item 27. Item 26 requires special consideration and is both presented and tabulated later.

Table 8

Response Frequencies, Means and Standard Deviations, and Tests of Binomial Assumptions on Proportions of No Response Values For Items 17 Through 25 and Item 27

Item No.	ABBR Statement	Response Values		Univar Stat		Binomial	
		1=No/%	2=Yes/%	Mean	Std	Test	PRintails
17	Reading manuals?	29/8.6	309/91.4	1.914	0.280	.10	.4356
18	Writing manuals?	35/10.4	303/89.6	1.896	0.305	.10	.8990
19	Math manuals?	37/10.9	301/89.1	1.891	0.313	.10	.6245
20	Language Arts manuals?	118/34.9	220/65.1	1.651	0.477	.10 .50	.0000 .0000
21	Social Studies manuals?	281/83.1	57/16.9	1.169	0.375	.50 .90	.0000 .0000
22	Science manuals?	235/69.5	103/30.5	1.305	0.461	.50 .90	.0000 .0000
23	Use computing?	75/22.2	263/77.8	1.778	0.416	.10 .50	.0000 .0000
T24*	Name of JLC consultant?	110/32.5	228/67.5	1.675	0.469	.10 .50	.0000 .0000
25	Reports for planning?	134/39.6	204/60.4	1.604	.0490	.10 .50	.0000 .0002
T27*	Server report?	279/82.5	59/17.5	1.175	.0380	.50 .90	.0000 .0000

Note: * Item 24 was transformed through coding 30 observations valued at 3 on the observation schedule for SCHOOL NOT ON JLC LIST and 3 observations at 4 involving SUBSTITUTE TEACHERs to the transformed value of 1.

** 27 was recoded to having or not having a SERVER REPORT. If anything from JLC or the Server was produced, the response was considered YES, otherwise NO.

From Table 8 one may take the following conclusions generalized to all second, third, and fourth grade APS classrooms.

1. The observed data do not permit rejecting the hypothesis that in 10% of the classrooms Reading, Writing, and Mathematics software manuals were not maintained in the storage areas for computer manuals.
2. Between 10% and 50% of the storage areas for computer manuals did not contain Language Arts Manuals.
3. Between 50% and 90% of the storage areas for computer manuals did not contain Social Studies Manuals.
4. Between 50% and 90% of the storage areas for computer manuals did not contain Science Manuals.

In short: (S) Observations made of second, third, and fourth grade APS classrooms indicated a serious lack of display of computing related materials on spaces usually considered optimal for display.

A statement should be made about the negative way of presenting the conclusions in the foregoing statements 2, 3, and 4. Note that the hypotheses tested pertained to "No" values: alternatively that there would be 10% Noes, 50% Noes, or 90% Noes. Statements 2, 3, and 4 are meant to reflect rejection of hypotheses of absence of the manuals at the corresponding proportions. The two proportions in each statement bracket the intervals on which the equivalent observed proportions resided.

Data suggest that in random visitation of classrooms at the second, third, and fourth grade levels, in between 10% and 50% of the visitations there would be no evidence that the teachers had applied or intended to apply computing during the instructional day. In fact, the

best guess from the evidence is that in about 25% of the cases during the closing weeks of school, there would be no computing activities during the typical instructional day.

Item 24 was transformed through coding 30 observations valued at 3 on the observation schedule for SCHOOL NOT ON JLC LIST and 3 observations valued at 4 involving SUBSTITUTE TEACHERs to the transformed value of 1. Thereby, the scale for item 24 had the desired range. On the basis of the transformed scale one concludes that between 10% and 50% of second, third, and fourth grade teachers in Atlanta Public Schools did not know the names of their respective Josten's Consultants. More specifically, the data are suggestive that about one in three teachers could not name their corresponding Josten's Consultant.

Between 10% and 50% of the teachers did not use server reports to help with instructional planning. In the present data about 40% (4 in 10) told the observers they did not plan with the help of server reports!

Moreover, about 80% could not produce a "server report" however loosely interpreted. Unfortunately, the observers were not careful in coding a Yes only for bona fide "server reports." They coded Yes if they received anything from the teachers. One wonders if the teachers themselves knew how a server report should look. In any case statistical hypotheses testing suggests between 50% and 90% of the teachers from all second, third, and fourth grade APS classrooms would not be able to produce anything when asked to show their server reports.

The following frequency table records the months in the school year on the "server reports" received by the observers. The distribution speaks for itself.

School Month of Latest Server Report?			
Month	Value	Frequency	Valid Percent
October	2.00	3	.9
November	3.00	5	1.5
December	4.00	4	1.2
February	6.00	8	2.4
March	7.00	5	1.5
April	8.00	7	2.1
May	9.00	27	8.0
None	.	279	82.5
		Total: 338	Total: 100.0
Valid Cases: 59		Missing Cases: 279	

Item 26 pertained to the frequency with which reports were received from the server. Information for the item was requested prior to asking teachers to see their latest server report. Table 9 reports frequency distributions of observed and recoded values for item 26. Recoding of observed values for item 26 was required for a scale having meaningful ordinal properties. Two additional adjustments (recodings) were required such that values for subsequent analyses would lie on a scale between 1 and 2. The computer statements accomplishing these goals follow:

```
COMPUTE SCALE026 = ITEM026.
RECODE SCALE026 (1 = 10) (2=9) (3=8) (4=6) (5=5) (6=3) (7=2)
(8=1) (9=4) (10=7).
*LET ITEM026 LIE ON A SCALE BETWEEN 1 AND 2.
COMPUTE SI10D026 = 1 + (SCALE026/10).
*SHRINK THE UPPER END OF SCALE026 RELATIVE TO THE LOWER END.
COMPUTE LOG026 = LG10(SCALE026).
```

Table 9

Frequency Distributions of Observed and Recoded Values for Item026

Item026: How often do you receiver Server Reports?				Scale026: Ordinal Scaling			
Value Label	Value	Freq	Percent	Value Label	Value	Freq	Percent
Daily	1	6	1.8	Not at all	1	92	27.2
Two to four a week	2	15	4.4	Each semester	2	19	5.6
Weekly	3	91	26.9	Each grading period	3	15	4.4
Two or three a month	4	62	18.3	Every two months	4	3	.9
Monthly	5	32	9.5	Monthly	5	32	9.5
Each grading period	6	15	4.4	Two or three a month	6	62	18.3
Each semester	7	19	5.6	Upon Request	7	3	.9
Not at all	8	92	27.2	Weekly	8	91	26.9
Every two months	9	3	.9	Two to four a week	9	16	4.4
Upon request	10	3	.9	Daily	10	6	1.8
		338	100.0			338	100.0
Total			5.13	Total			4.92
Mean			2.24	Mean			2.98
Std. Dev.				Std Dev			
SI10D026 = 1 + (Scale026/10)				LOGO26 = LG10 (Scale026)			
Value Label	Value	Freq	Percent		Value	Freq	Percent
Not at all	1.1	92	27.2		.00	92	27.2
Each semester	1.2	19	5.6		.30	19	5.6
Every six weeks/ grading period	1.3	15	4.4		.48	15	4.4
Every two months	1.4	3	.9		.60	3	.9
Monthly	1.5	32	9.5		.70	32	9.5
Two or three a month	1.6	62	18.3		.78	62	18.3
Upon Request	1.7	3	.9		.85	3	.9
Weekly	1.8	91	26.9		.90	91	26.9
Two to four a week	1.9	15	4.4		.00	15	4.4
Daily	2.0	6	1.8			6	1.8
		338	100.0				100.0
Total			1.49			338	.56
Mean			.30				.38
Std Dev							

Note: *RESCALE ITEM026 SO LARGEST VALUE MEANS HAVING MORE REPORTS
COMPUTE SCALE026 = ITEM026.
RECODE SCALE026 (1 = 10)(2=9)(3=8)(4=6)(5=5)(6=3)(7=2)(8=1)(9=4)(10=7).
*LET ITEM026 LIE ON A SCALE BETWEEN 1 AND 2.
COMPUTE SI10D026 = 1 + (SCALE026/10).
*SHRINK THE UPPER END OF SCALE026 RELATIVE TO THE LOWER END.
COMPUTE LOG026 = LG10(SCALE026).

One notes coding for SI10D026 for the relationship defined by SI10D026= 1 + (SCALE026/10) has a mean and standard deviation of approximately comparable values to those of items 1 through 10. Additional tests, reported in later sub-sections will provide additional evidence against which the recoding scheme may be evaluated. However, additional immediate evidence for the efficacy of the transformations appears in the presentation of Table 10 of selected distribution tests applied to observed values for item 26: How often do you receive server reports?

Table 10

Selected Distribution Tests Applied to Observed Values For ITEM026: How often do you receive server reports?

Chi-Square Test for Random Responses				
	Category	Obs Frequency	Expected	Residual
Daily	1.00	6	33.80	-27.80
Two to four a week	2.00	15	33.80	-18.80
Weekly	3.00	91	33.80	57.20
Two or three a month	4.00	62	33.80	28.20
Monthly	5.00	32	33.80	1.80
Each grading period	6.00	15	33.80	-18.80
Each semester	7.00	19	33.80	-14.80
Not at all	8.00	92	33.80	58.20
Every two months	9.00	3	33.80	-30.80
Upon request	10.00	3	33.80	-30.80
		Total: 338		

Chi-Square	D.F.	Significance
327.030	9	.000

Kolmogorov-Smirnov Goodness of Fit Test to the Normal of Scale026: Ordinal Scaling of Item 026		
Test Distribution - Normal	Mean:	4.9201
	Standard Deviation:	2.9771
Cases: 338		

Most Extreme Differences				
Absolute	Positive	Negative	K-S Z	2-tailed P
.18092	.17823	-.18092	3.326	.000

Kolmogorov-Smirnov Goodness of Fit Test to the Normal of LOG026		
Test Distribution - Normal	Mean:	.5631
	Standard Deviation:	.3784
Cases: 338		

Most Extreme Differences				
Absolute	Positive	Negative	K-S Z	2-tailed P
.25859	.20384	-.25859	4.754	.000

Additional conclusions at this point may be drawn for individual items on the Observation Schedule. They are listed below with, as before, an additional classification indicating either support (S) or use (U) for each conclusion:

1. (U) The data also suggest that teachers were receiving only limited benefits, compared with potential benefits, from the computing power at their disposal for production of worksheets and handouts. On the average, only about 15% of the opportunities were reported to have been capitalized upon.
2. (S) The observed data do not permit rejecting the hypothesis that in 10% of second, third, and fourth grade APS classrooms Reading, Writing, and Mathematics software manuals were not maintained in the storage areas for computer manuals.
3. (S) Between 10% and 50% of the storage areas for computer manuals did not contain Language Arts Manuals.
4. (S) Between 50% and 90% of the storage areas for computer manuals did not contain Social Studies Manuals.
5. (S) Between 50% and 90% of the storage areas for computer manuals did not contain Science Manuals.
6. (S) The data are suggestive that about one in three teachers could not name their corresponding Josten's Consultant.
7. (S) In the present data about 40% (4 in 10) of the teachers told the observers they did not plan with the help of server reports!

8. (S) One hundred sixty-four teachers (of 338) claimed to receive server reports monthly or less often. Of the 164, 92 claimed not to receive server reports at all! One hundred twelve claimed to receive the reports at least weekly. Of the 112, 21 claimed to receive the reports more frequently than once per week.
9. (S) About 80% of the classroom teachers could not produce a "server report" however loosely interpreted. Furthermore, statistical hypotheses testing suggests between 50% and 90% of the teachers from all second, third, and fourth grade APS classrooms would not be able to produce anything when asked to show their server reports.

Table 11 presents statistical tests of goodness of fit to the normal distribution of item 28 observed values and their transformation. The correction for observed values of zero is reflected in Table 11. One concludes that (U) on the average, observers noted about 1.5 students using the classroom computers during the observation sessions.

Table 11

Statistical Tests of Goodness of Fit to the Normal Distribution of Item 28 Observed Values and Their

Transformation

Observed Values				Shifted Logarithm to Base 10 (1 added)			
K-S Goodness of Fit to Normal				K-S Goodness of Fit to Normal			
Mean	STD	K-S Z	Prob	Mean	STD	K-S Z	Prob
1.468	1.960	6.162	.000	1.154	0.318	6.439	.000

Note: *ITEM028 VALUES ARE 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.
*S PREFIX IS SHIFT.
COMPUTE SLOG028 = 1 + LG10(ITEM028).
IF (ITEM028 EQ 0) SLOG028 = 0.9.

Items 29 through 46 represent measures on three students for each classroom observed. It was deemed sensible, therefore, to compute means for each type of measure for use in subsequent modeling. Accordingly, the following statements appear in the SPSS calculations:

```
COMPUTE TIMES     = (ITEM029 + ITEM035 + ITEM041)/3.
COMPUTE STORY     = (ITEM030 + ITEM036 + ITEM042)/3.
COMPUTE MESSAGE   = (ITEM031 + ITEM037 + ITEM043)/3.
COMPUTE STUDREPT  = (ITEM032 + ITEM038 + ITEM044)/3.
COMPUTE MATHPROB  = (ITEM033 + ITEM039 + ITEM045)/3.
COMPUTE MORE_USE  = (ITEM034 + ITEM040 + ITEM046)/3.
```

Table 12 presents statistics for student questions averaged across the students designated A, B, and C. The means and standard deviations presented are means and standard deviations for the averages contributed from each classroom observed. Values in Table 12 represent observed means.

Table 12

Descriptive Statistics for Student Questions Averages Across Students Designated A, B, C

Times: Average of Times Each Day You Use a Computer									Mean: 1.021 Std Dev: 0.775	
Value	Freq	Percent	Value	Freq	Percent	Value	Freq	Percent	Percentile	Value
.00	73	21.6	1.67	24	7.1	3.67	1	.3	10.00	.000
.33	17	5.0	2.00	35	10.4	4.00	1	.3	25.00	.333
.67	20	5.9	2.33	9	2.7	4.67	1	.3	50.00	1.000
1.00	114	33.7	2.67	6	1.8				75.00	1.333
1.33	35	10.4	3.00	2	.6	Total	338	100.0	99.00	3.407

K-S Goodness of Fit to Normal as Test Distribution for Times
K-S Z: 3.188; 2-tailed P: .000

Average	To Write A Story		To Write a Message		To Write a Report		To Work a Math Problem		To Use The Computer More	
Value	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent
1.00	127	37.6	140	41.4	235	69.5	56	16.6	38	11.2
1.33	70	20.7	62	18.3	54	16.0	26	7.7	7	2.1
1.67	49	14.5	72	21.3	30	8.9	63	18.6	29	8.6
2.00	92	27.2	64	18.9	19	5.6	193	57.1	264	78.1
Totals:	338	100.0	338	100.0	338	100.0	338	100.0	338	100.0
Mean		1.438		1.393		1.169		1.721		1.845
STD		.410		.388		.292		.378		.328
Percentile	Value		Value		Value		Value		Value	
10.00		1.000		1.000		1.000		1.000		1.000
25.00		1.000		1.000		1.000		1.667		2.000
50.00		1.333		1.333		1.000		2.000		2.000
75.00		2.000		1.667		1.333		2.000		2.000
99.00		2.000		2.000		2.000		2.000		2.000

Kolmogorov-Smirnov Test of Goodness of Fit to the Normal Distribution

K-S Z	4.279	4.746	7.602	6.263	8.506
2-tail Prob	.000	.000	.000	.000	.000

The Kolmogorov-Smirnov Goodness of Fit Test for the aggregated data suggests that each observed distribution is not well-fit with the normal. However, the means of the means, and the standard deviations of the means, are in ranges not too different from the ranges for

items 1 through 10 to make them useful as indicators of the same phenomenon: the classroom environments. Five percentiles are presented in Table 12 for each aggregated variable: 10th, 25th, 50th, 75th, and 99th. Note that the percentiles carry considerable redundancy.

The median of the average number of times each day students used (U) computers was 1.0. Unfortunately, the instrument did not provide for collecting data on quality of use or on relevance of the use to the teaching objectives. At the time the instrument was constructed those types of data were expected from another source.

From means of the means and standard deviations of the means reproduced below from Table 12, one observes in the middle four columns that computers were probably used more at the end of the year for working math problems and less for writing reports than for writing stories or messages (U). One notices, too, that the means and standard deviations are in a nice range for coupling these data with other data descriptive of the computing environment.

Average	To Write a Story	To Write a Message	To Write a Report	To work with a Math Problem	To Use the Computer More
Mean	1.438	1.393	1.169	1.721	1.845
STD	.410	.388	.292	.378	.328

In the foregoing data and in Table 12, one should remember for interpretation that the frame of reference was a week. Further, for all columns, the closer the mean is to 2.0 the more unanimous were the students in their agreement on Yes; analogously, the closer the mean is to 1.0 the more unanimous were the students in their agreement on No.

In 264 of the 338 observations the three students interviewed were in complete agreement that the computer needs to be used more. In 38 of the cases they were in complete agreement that they did not want to use it more. In 29 of the observations 2 out of the 3 agreed to more use, and in 7 of the observations 2 out of the 3 agreed in not wanting to use it more.

Since values were averaged in computing data for variables named TIMES, STORY, MESSAGE, STUDREPT, MATHPROB, and MORE_USE, it is reasonable to inquire further into differences in the data vectors that were averaged for each computed new variable. Table 13 contains data representing Statistical tests for sample-wide agreement among item responses of 3 students in each classroom for observed data entered into the averaging algorithm. Note that Table 13 is divided into two parts to reflect statistics appropriate for the number of values recorded as responses in the respective situations: (a) Summary of Friedman's test for 3 (the number of students questioned in each class) related measures having > 2 values, and (b) summary of Cochran's Q analyses for related measures of dichotomies.

Table 13

Statistical Tests for Sample-wide Agreement Among Item Responses of 3 Students in Each Classroom

Summary of Friedman's Test for Related Measures Having > 2 Values													
Type of Item	Data									Friedman Statistics			
	Item			Item			Item						
	No.		Mean	No.		Mean	No.		Mean	Cases	Chi-Square	df	Sig
Times	29		1.99	35		2.06	41		1.94	338	2.5044	2	.2859
Summary of Cochran's Q Analyses for Related Measures of Dichotomies													
Type of Item	Data									Cochran Q Statistics			
	Item			Item			Item						
	No	1s	2s	No	1s	2s	No	1s	2s	Cases	Chi-Square	df	Sig
Story	30	184	154	36	188	150	42	198	140	338	2.6218	2	.2696
Message	31	202	136	37	204	134	43	210	128	338	0.7761	2	.6784
Studrept	32	276	62	38	284	54	44	283	55	338	1.3571	2	.5073
Mathprob	33	89	249	39	96	242	45	98	240	338	1.5056	2	.4710
More_Use	34	50	288	40	58	280	46	49	289	338	4.0556	2	.1316

Across the sample of 338 classrooms, by Table 13, one concludes that the randomly selected students were in close agreement in their responses to the items entered into the calculations for TIMES, STORY, MESSAGE, STUDREPT, MATHPROB, and MORE_USE.

*Univariate Statistics for Scales Computed From Items and Item Transformations

Other scales also were calculated. All such calculations were undertaken for increasing parsimony in use of the data in combination with variables from the Computing Potential instrument and with variables from the LISREL model. Beyond the 5 computed variables described in the foregoing, 10 additional ones were computed. The description of the computation of the 10 and the motivation for scaling each follow. The reader should understand that the combinations of items are not supported by hard theory. Rather, the combinations seemed to the writers to be promising in combination. Subsequent analyses present tests of empirical verifications of the judgments presented here.

Reflection on the items composing the Observation Schedule suggest the possibility of collapsing some of them into a scale descriptive of the environment in the close or nearby neighborhood of the computers. The computed variable therefore was named NEARBY and was defined by the following SPSS statement:

```
COMPUTE
    NEARBY  =  ITEM001  +   EM002  +  ITEM003  +  ITEM004  +
               ITEM005  +  ITEM006  +  ITEM007  +
               ITEM009  +  ITEM010  +             ITEM020
               ITEM017  +  ITEM018  +  ITEM019  +           +
               ITEM021  +  ITEM022  +  ITEM023  +
               ITEM024  +  ITEM025.
```

NEARBY, thus, was composed as an additive scale. Item 8 was not included in this scale because its presence deteriorated the reliability.

A second composite was intended to capture a reading on the more remote environment of the classrooms containing the computers. The variable was named

ROOMENV representing ROOM ENVironment. It was computed according to the following SPSS statement:

```
COMPUTE
    ROOMENV = LOGO11 + LOGO12 + LOGO13 + LOGO14.
```

Note that ROOMENV is based on logarithms derived from the observations. The data entered into the computed variable needed to have properties similar to data in other scales. Also the data needed to be conformable for any reliabilities calculated for the entire Observation Schedule.

Another scale having potential interest was based on data pertaining to the software manuals items. Thus, the computed variable was named MANUALS and was computed according to the following SPSS statement:

```
COMPUTE
    MANUALS = ITEM002 + ITEM009 + ITEM010 +
              ITEM017 + ITEM018 + ITEM019 + ITEM020 +
              ITEM021 + ITEM022. +
```

Furthermore, an interest in a more general resources composite was anticipated. Consequently the variable with shortened name (SPSS handles variable names of 8 or fewer characters) RESOURCS was computed with the following SPSS statement:

```
COMPUTE
    RESOURCS = ITEM001 + ITEM002 + ITEM004 + ITEM006 +
               ITEM007 + ITEM009 + ITEM010 +
               LOGO16
               ITEM017 + ITEM018 + ITEM019 + ITEM020 +
               ITEM021 + ITEM022 + ITEM023 +
               ITEM024 + ITEM025 + ITEM026. +
```

Note that three of the variables entered into the computation of RESOURCS represented transformations on the observed data. To have retained the raw data in the computation would have seriously compromised the inter-item consistency (reliability) of the computed scale.

Two of the variables seemed to be functions unique to the teaching style of the teachers rather than properties of the classrooms. Thus a variable named TEACHER was computed according to the following SPSS statement:

```
COMPUTE
     TEACHER  =  I50D015 + LOG016.
```

An issue of great importance to an understanding of achievement in the second, third, and fourth grade classrooms of the Atlanta Public School System was the contribution of the server/ server reports in motivating instruction. A variable compositing related data from the Observation Schedule was computed according to the following SPSS statement:

```
COMPUTE
   SERVER  =  ITEM023  +  TRAN024  +  ITEM025  +  SI10D026 +
              SERVREPT.
```

One again should note that observations on 3 compositing items were manipulated for conformity with properties of other data collected with the Observation Schedule.

A composite scale for the data collected from the 3 randomly selected students interviewed in each classroom was deemed to have potential. Observations on the number of students using computers (item 28) were included as a transformation in the scale named STUDENT3 computed according to the following SPSS statement:

```
COMPUTE
  STUDENT3 = SLOG028 + ITEM029 + ITEM030 + ITEM031 +
             ITEM032 + ITEM033 + ITEM034 +
             ITEM035 + ITEM036 + ITEM037 + ITEM038 +
             ITEM039 + ITEM040 + ITEM041 + ITEM042 +
             ITEM043 + ITEM044 + ITEM045 + ITEM046.
```

Another computed scale was a composite of aggregated data on similar items for the 3 students interviewed in each classroom. This scale should be quite redundant on the scale produced by STUDENT3. Item 28, however, did not contribute to the scale named STUDAVGS computed according to the following SPSS statement:

```
COMPUTE
     STUDAVGS = STORY + MESSAGE + STUDREPT + MATHPROB + MORE_USE.
```

Of usual common interest for instruments similar to the Observation Schedule would be scales representing indices of total performance. Two such scales were computed. The first was a summation of raw or transformed data on each of the 46 items computed according to the following SPSS statement:

```
COMPUTE
  ITEMS_46 = ITEM001 + ITEM002 + ITEM003 + ITEM004 + ITEM005 +
             ITEM006 + ITEM007 + ITEM008 + ITEM009 + ITEM010 +
             LOGO11 + LOGO12 + LOGO13 + LOGO14 + LOGO15 +
             LOGO16 +
                      ITEM017 + ITEM018 + ITEM019 + ITEM020 +
             ITEM021 + ITEM022 + ITEM023 +
                                           TRAN024 +
                                 ITEM025 +
             SI10D026 + SERVREPT + SLOG028 +
                                           ITEM029 + ITEM030 +
             ITEM031 + ITEM032 + ITEM033 + ITEM034 + ITEM035 +
             ITEM036 + ITEM037 + ITEM038 + ITEM039 + ITEM040 +
             ITEM041 + ITEM042 + ITEM043 + ITEM044 + ITEM045 +
             ITEM046.
```

The second containing 34 items summed average responses, rather than individual responses, for the three students interviewed in each classroom. Otherwise, ITEMS_34 was meant to be exactly parallel to ITEMS_46. It was computed according to the following SPSS statement:

COMPUTE

ITEM5_34	=	ITEM4001	+	ITEM4002	+	ITEM4003	+	ITEM4004	+	ITEM4005	+
		ITEM4006	+	ITEM4007	+	ITEM4008	+	ITEM4009	+	ITEM4010	+
		LOGO11	+	LOGO12	+	LOGO13	+	LOGO14	+	LOGO15	+
		LOGO16	+								
				ITEM4017	+	ITEM4018	+	ITEM4019	+	ITEM4020	+
		ITEM4021	+	ITEM4022	+	ITEM4023	+				
								TRAN024	+		
										ITEM4025	+
		SI100026	+	SERVREPT	+	SLOGO28	+				
		TIMES3	+	STORY	+	MESSAGE	+	STUDREPT	+		
		MATHPROB	+	MORE_USE	+						

Considering the computed scales to be what they are: additive scales or summative scales, it is of interest to define their properties. An arbitrary decision was taken to present tables including distinct scale values only for scales having fewer than 30 values. Therefore, two tables are required to lay out the properties of the additive scales. The first, Table 14, presents descriptive statistics for additive scales having fewer than 30 distinct values.

Table 14

Descriptive Statistics for Additive Item Scales Having Fewer Than 30 Distinct Values

NEARBY: Evidence From Close Environment									Mean 28.533 Std Dev 3.011	
Value	Freq	Percent	Value	Freq	Percent	Value	Freq	Percent	Percentile	Value
18.0	10	3.0	24.0	6	1.8	29.0	80	23.7	10.00	25.0
19.0	1	.3	25.0	13	3.8	30.0	47	13.9	25.00	27.0
21.0	2	.6	26.0	21	6.2	21.0	38	11.2	50.00	29.0
22.0	2	.6	27.0	33	9.8	32.0	27	8.0	75.00	30.0
23.0	4	1.2	28.0	40	11.8	33.0	8	2.4	99.00	34.0
K-S Goodness of Fit to Normal as Test Distribution for NEARBY K-S Z: 3.146; 2-tailed P: .000										
MANUALS: Evidence From Availability of Manuals									Mean 14.234 Std Dev 2.000	
Value	Freq	Percent	Value	Freq	Percent	Value	Freq	Percent	Percentile	Value
9.	16	4.7	14.	89	26.3				10.00	12.0
10.	5	1.5	15.	57	16.9				25.00	13.0
11.	9	2.7	16.	60	17.8				50.00	14.0
12.	17	5.0	17.	22	6.5				75.00	16.0
13.	51	15.1	18.	12	3.6				99.00	18.0
K-S Goodness of Fit to Normal as Test Distribution for MANUALS K-S Z: 3.007; 2-tailed P: .000										
STUDAVGS: Evidence From Averages for Three Students									Mean 7.565 Std Dev 1.272	
Value	Freq	Percent	Value	Freq	Percent	Value	Freq	Percent	Percentile	Value
5.00	38	11.2	7.33	37	10.9	8.67	5	1.5	10.00	5.000
6.00	8	2.4	7.33	7	2.1	8.67	21	6.2	25.00	7.000
6.33	7	2.1	7.67	9	2.7	9.00	32	9.5	50.00	7.667
6.33	4	1.2	7.67	22	6.5	9.33	1	.3	75.00	8.417
6.67	8	2.4	8.00	1	.3	9.33	11	3.3	99.00	10.000
6.67	12	3.6	8.00	42	12.4	9.67	8	2.4		
7.00	30	8.9	8.33	17	5.0	10.00	6	1.8		
7.00	2	.6	8.33	10	3.0					
K-S Goodness of Fit to Normal as Test Distribution for STUDAVGS K-S Z: 1.935; 2-tailed P: .001										

The second, Table 15, presents descriptive statistics for additive scales having at least 30 distinct values.

Table 15

Descriptive Statistics for Additive Item Scales Having At Least 30 Distinct Values

Scale	Mean	Std Dev	Percentile					K-S GOF to NORMAL	
			10	25	50	75	99	K-S Z	2-tailed P
ROOMENV	4.129	.704	3.600	3.600	3.800	4.400	7.063	4.160	.000
RESOURCS	29.03	3.53	24.89	27.20	29.70	31.28	35.70	1.717	.005
TEACHER	2.243	.987	0.890	1.578	2.090	2.802	4.804	1.570	.014
SERVER	7.723	1.25	6.100	7.100	7.800	8.800	9.800	2.215	.000
STUDENT3	26.91	5.36	15.90	24.90	27.48	30.81	37.55	2.099	.000
ITEMS_46	65.80	7.90	55.37	62.16	67.09	71.00	80.93	1.970	.001
ITEMS_34	48.63	5.03	42.70	46.20	49.44	51.77	58.53	1.956	.001

Tables 14 and 15 differ from each other formatwise in that Table 14 contains frequency tables for observed values for each included variable. Both tables present scale means and standard deviations and values of the scales at the same percentiles: 10th, 25th, 50th, 75th, and 99th. Both tables contain Kolmogorov-Sminrov Goodness of Fit Statistics to the Normal Distribution (K-S GOF to Normal). The Goodness of Fit statistics: the K-S Z, and the 2-tailed P[robability], were explained in an earlier sub-section. The principles for the earlier explanation apply here, too. Perhaps the most salient notation to make from Tables 14 and 15 is that no scale presented within either had computed values distributed according to properties for normal distributions.

The rows of data for ITEMS_46 and ITEMS_34 deserve additional commentary. The minimum values for both tables are also the modal values. The z-score for skewness for ITEMS_46 is -7.95, and for kurtosis is 5.15. The z-score for skewness for ITEMS_34 is -9.09, and for kurtosis is 9.28.

Observer Comments

Appendix B contains a table of all volunteered observer comments based on observations and interactions with teachers and students. In some instances, grammar was changed. Otherwise the contents of Appendix B are verbatim. Table 16 presents a selected list of comments extracted from Appendix B.

In summary one notices that at least some teachers would like to have had more assistance with applications of the computer in instruction. The server reports were a mystery to at least some teachers. Many teachers cited technical and reliability problems with equipment. For some students it was weeks between opportunities to use the computers. At least one student never used the computer. Some teachers did not unpack materials from Josten's. A surprising number of teachers tended to deemphasize computing in the closing weeks of the academic year.

More than a few observations noted that students must finish their work before they may use the computers. Such a rule speaks against the computer as an instructional tool except for the fastest students who are likely also to be the brightest.

Table 16

Selected Volunteered Observer Comments from Appendix B

Case	Comments
7	Teacher: "Computers are always down."
24	If the teacher were able to take equipment home with her in order to make worksheets and various exercises, she would love to do so.
35	Teacher does not use server reports. She prefers to do planning on her own.
53	Teacher commented: "System stays down often. Technical problems--
61	Very enthusiastic about computer use by students and teacher, want to take one home.
75	Neither students nor teacher were really enthusiastic about computer work. There was no evidence of work products. Students claimed to use machines every 2 weeks, one time a week, and every other week.
76	Teacher knew nothing of server reports, etc.
79	Teacher really not comfortable with computer use--would like help.
86	Josten's materials were still in unopened boxes.
92	First student "never uses computer."
93	Software sits unopened on shelves.
100	They have packed up for the year. Keyboards & displays are still out. Yet all disks and manuals are packed up! Teacher didn't seem too interested in computers, that tended to rub off on students. Obviously computers in her rooms were packed up 3 weeks before school was to be out & other teachers are still using theirs! Teacher doesn't know what/who server is.??
104	Students said that they do not follow the schedule. They must finish their work before they can work on the computer.

(Continued on next page)

Table 16: Selected Volunteered Observer Comments from Appendix B continued

Case	Comments
107	Computers were not in use for two weeks.
112	Much [evidence of] use of computers throughout hallways.
113	Hall bulletin board full of student computer work.
120	Teacher keeps her own record on each student's performance. [Rather than relying on reports from the server]
123	Teacher monitors students herself [rather than use server reports].
124	Computer is a reward for completed homework.
131	One computer station was blocked to accessibility by a TV set.
132	Students were very unsure of what to do on computers.
133	[Software instruction manuals were] boxed-up.
135	[Displays were kept in] notebooks.
136	Could not produce server report so claim of receiving one each day is questionable. [Teacher claimed] 10 [software kits] boxed up.
137	[Software instruction manuals were] boxed up for (Continued on next page)year.
143	Teacher generates computer [server] reports.
157	Manuals had been put away for Parents Night.
163	Josten's computer not operating properly--would like to have it working--unit content not easily determined. Cannot get out of study module without rebooting computer.
165	Students said that since it is the end of the year that they were not using the computers very much. (Bedlam)

(Continued on next page)

Table 16: Selected Volunteered Observer Comments from Appendix B continued

Case	Comments
168	Teacher asked for follow-up workshop on computer use.
169	Teacher had some suggestions to improve usage of computers. Manuals were packed up. Entire class [were using computers during observation].
170	Teacher does not use server reports.
173	No reports available due to computer failure.
176	Computer was down much of the time this year. Students had to score own tests.
178	Not all students [are] listed [on the server report].
179	Disks only [no manuals] [common for several teachers.] [Science computer manual] doesn't work [???] Server is not operable yet.
180	A student knew more about Josten's than the teacher!
181	General: Teacher does not use Josten's as intended.
184	General: Teacher seems to barely understand purpose of Josten's.
185	Manuals were not at work stations. [Others made similar statements] not used by students once they learn how to use computer. Science Software: Not easily accessible, need more server report is printed each Friday by consultant. Students [were] quite independent while working at computer station. Assist each other.
189	Teacher makes use of mills correlations notebook. Wants to learn how to make own diskettes to reinforce certain skills.
190	Computer manuals have been taken from room or misplaced. Teacher reported in October 1989: Had an operating manual but no computer manuals.
191	Student B, asked what he did, said he played [on the computer].

(Continued on next page.)

Table 16: Selected Volunteered Observer Comments from Appendix B continued

Case	Comments
194	All software and manuals were packed up.
195	Need to develop a lesson plan software package. Should be able to use "report card" instead of grade books. Easier to explain to parents.
198	Need more training on computers.
199	Kids enjoy computers. Need more reading disks. [Present] reading disks are monotonous.
211	Teacher buys a lot of software on her own. Adds to Josten's. Children don't use manuals. Teacher would like software in area of social studies & science. The consultant is new to the school this year--service is poor. When consultant comes, she pulls it [server reports] off-- only once or twice a year do we get these reports. Frequently, computers are off network--teachers have to boot non-Josten's software to use computers. "Labnet not active" is the message about half the time. Consultant [is] not knowledgeable--has not kept schedule for training this year at this school-- teachers know what they need. Want help on what they identify not on what consultant decides. Teacher is winding up end of year activities--not used computer as frequently this week.
213	Display screens were cleaned this week. Children don't use manuals--only teacher does. Teacher doesn't feel comfortable with BankStreet--needs help. Correlations of skills (reading and math) with labnet software are complete and useful. Teacher had to redo the information. Teacher doesn't use science tool kit--doesn't understand. need workshops on IBM only, not on apples. (IBM equipment used at grade 4 only--prescription learning uses apply at grades 2 and 3.) Teacher doesn't understand BankStreet Writer or pause. Consultant no help. Comes very infrequently. Consultant did 3 activities with children all year. Some math prescriptions work--some don't work (not generated). Consultant hasn't provided [help with instructional planning from server reports]. Teacher doesn't know how to generate it [server reports].
215	In fall the technician accidentally destroyed microtype disks. Josten's has not replaced all yet. Two or 3 computers do not print in classroom. [There should be] emphasis on effective instructional technology--skills books--the match of skills to software [is] sometimes incomplete. Teacher has identified specific problems.

(Continued on next page)

Table 16: Selected Volunteered Observer Comments from Appendix B continued

Case	Comments
217	Children use instructions on disks.
223	Printer has not operated all of first semester but is now working.
226	Three children on computer all said they were on cause they had finished their work at their desks.
229	Printer is often broken.
230	No printer in class.
232	Ms. Johnson only allows her students on the computer when they have finished their work. None of the three students I picked used the computer last week.
233	Computers very useful for review, drill, and practice, but nothing else.
239	Schedules were posted but all students were scheduled at the same time for each of the 2 reading groups. Note: Student A commented that her class was so slow and worked at such a low level that they didn't have much time to work on the computer. Teacher made almost identical comment. Children in class work at lowest level and hard to schedule them because of other class work.
241	Teacher's comment: "It would be really good if teacher is permitted to take computers home over the summer" [for the purpose of preparing worksheets, etc.].
244	Student B: "Did not use it [a computer] last week at all."
248	BankStreet Writer was the only manual available nearby. Teacher reports that by now students know when to go to the microcomputers [therefore, a teacher's computer schedule is unnecessary]. Note: Teacher located me before I left the school and said she does receive reports sometimes. However, they are inaccurate because 5 students do not have their names in the system and have to key in on someone else's name. Math and reading materials are sometimes at too low a level, so teacher uses 3rd grade materials.

(Continued on next page)

Table 16: Selected Volunteered Observer Comments from Appendix B continued

Case	Comments
276	Teacher does not see consultant! Teacher said all students did math last week. This is a REP class of 4th graders. They use the Josten's materials, but the teacher does not receive any Josten's support and has not had training. Teacher did not attend workshop.
282	Student A: Uses computer 1 time per month.
290	Server Reports: Lot of problems throughout year because student's names wouldn't come up. One server report for the year. Student C: Usually 2 times a day on Tuesdays only. Teacher would like to have more workshops.
292	Student used a computer less often than once per week. Had been on once this month (April).
301	Student B uses computer once per month.
303	Student C uses computer once per month.
307	Student C uses computer once per month.
310	Teacher [could not produce server report because the teacher gave it] to students to use.
325	[Teacher was] too busy trying to "boot" computers that she couldn't look for it [the server report]. Computers weren't operating. Teacher trying to find problem.
326	Most computer manuals are stored in the other 4th grade section where the server is.

From empirical data evidence in this section it is clear that subsequent procedures should not assume multinormal distributions. In particular, unweighted least squares should be used for factor analytic computations to be reported in a separate article.

Reliabilities for Scales and Coefficients of Concordance for Scale Components

Table 17 contains summary data for reliability analyses (inter-item consistencies) and coefficients of concordance of scales from the Observation Schedule. The reader should be informed that in the absence of transformations of items 11 through 16, item 24, item 26, and item 28, the reliabilities would be seriously deteriorated.

Table 17

Reliability Analyses (Inter-Item Consistencies) and Coefficients of Concordance of Scales From the Observation Schedule

Scale Name Report [Computer]		Reliability Coefficients		Kendall's Coefficient Concordance
	Number of Items	Alpha	Standardized Item Alpha	
NEARBY [NEAR 3]	18	.7127	.7213	[.1150]
ROOMENV [RMEN2C]	4	.6815	.6914	[.5068]
MANUALS [MANS]	9	.7020	.7344	[.2024]
RESOURCS [RES1D]	18	.7384	.7837	[.1409]
TEACHER [TEACHBD]	2	.1514	.2115	[.5385]
SERVER [SERV1A]	5	.5573	.5728	[.2891]
STUDENT3 [STUD1C]	19	.8572	.8735	[.2171]
STUDAVGS [STUD5]	5	.7440	.7431	[.3413]
ITEMS_46 [I461ACD]	46	.8595	.8644	[.0952]
ITEMS_34 [I341ACD]	34	.7917	.8042	[.0909]

Note: Kendall's Coefficients of Concordance were hand calculated.

The SPSS RELIABILITY procedure calculates reliability correctly. It calculates an incorrect value for W as the ratio of "SS(Between Measures) / SS(Total). The coefficients of concordance reported in Table 17, thus, are not the coefficients computed by SPSS. An explanatory digression is required.

The following digression on computing and interpreting Kendall's coefficient of concordance (W) is necessitated because SPSS, without very special consideration, produces incorrect coefficients. Concordances from Siegel, computed incorrectly with SPSS, validate this claim.

According to Siegel (1956), W bears a linear relation to the average of the Spearman [rank] correlations between all possible pairs of ranking variables (p. 229). As W increases, the average of all possible Spearman's rhos increases. ". . . W expresses the degree of association among k . . . [related] variables" (Siegel, p. 229). As such, W for an instrument measuring in ranks in the non-parametric sense is exactly analogous to the R**2 proportion of variation for the between people/ entity/ case/ object source (factor) in a design involving k-related measures. The between people factor represents classification by person/ case as in multiple regression repeated measures approaches to ANOVA. One should be cautious that computing algorithms input between people variation rather than between measures variation in defining the magnitude of W. The confusion is deepened since W produces a number that is labeled by SPSS-PC and SPSSX to represent concordance, a concept ordinarily pertinent to agreement among the instruments/ judges/ raters/ forms/ occasions.

The coefficient of concordance very roughly indexes the degree of agreement among the ranking variables (or measures) shown in the data and the maximum (perfect) agreement possible for them (p. 230). In maximum or perfect agreement, the total variation in the data would equal the total between people variation.

If one organizes the data with rater/ measure on the rows and entities rated on the columns--a counter-intuitive organization--SPSS will calculate W correctly. The principle to follow is always to calculate W from variation in the people/ cases/ entities/ objects measured, not from variation associated with differences in the instruments or measurement devices themselves.

Significant values of W for larger proportions calculated for it may be interpreted as meaning that the items are essentially comparable measures across the cases measured.

When W is significant, Siegel is clear in the recommendation that a pooling of the measures may serve as a representative of the best measure in the absence of external criteria. (pp. 237-238). The terminology Siegel used for the process was "consensual ordering."

A significance test of W is a test of the hypothesis of a chance magnitude in the average correlational relationship among all possible combinations of variable pairs. Larger values of W produce

significance tests at lower probabilities (thus at "higher" significance levels. The rejection region encompasses larger values of W.

Table 18 presents comparisons and contrasts between concordance and reliability. Under consideration of the foregoing comments and the contents of Table 18, it is necessary to note that the coefficients of concordance contained in Table 17 suggest that, while most of

the various scales of the Observation Schedule have acceptable reliabilities, there is in the practical sense little concordance among the items composing the scales. The reliabilities would need to be much higher to claim acceptable concordance. This problem suggests the need for further analyses, particularly for factor analyses to define the dimensionality of the various scales of the Observation Schedule.

In any case, one needs to summarize the contents of Table 17. The smallest non-standardized data alpha was .1514 for the two teacher items, the largest was .8595 for the 46 observation schedule instrument items. Neither scale will be used in the LISREL model, the first because the reliability is too low, and the second because it weighs too highly the 18 student items. Reliabilities on the other scales of interest for LISREL input range between .5573 for the 5 SERVER items to .7917 for the ITEMS_34 scale. ITEMS_34 was computed from the first 28 items and composites or aggregates for the 6 student items. The 5 means of student items (excluding the times each day you use a computer item) formed the additive scale named STUDAVGS with observed data alpha of .7440.

Table 18

Comparisons and Contrasts between Concordance and Reliability

Concordance	Reliability
Proportion of Variation	Proportion of Variation
Between People	Between People
Uncorrected for Error	Uncorrected for Error
Chi-Square or F-Ratio	Chi-Square or F-Ratio
Incorrect calculation of W from data laid out for reliability analysis by SPSS.	Correct calculation of r from data laid out for reliability analysis by SPSS.
Correct calculation of W from data laid out with repeated measures on the rows and persons in the columns for either RELIABILITY or NPAR TESTS analyses by SPSS.	Incorrect calculation of r from data laid out with repeated measures on the rows and persons in the columns for either RELIABILITY or NPAR TESTS analyses by SPSS.

The reasonable summary position based on the foregoing conclusions is that teacher proficiencies intended as outcomes of JLC training of APS teachers cannot be substantiated by this study. Conversely, the findings and conclusions suggest that these proficiencies are not evidenced in the APS classroom computer environment with the teacher and the JLC consultant as critical components of this environment.

Summary of Conclusions

All APS schools were represented in the sample. Observations were about equally divided by grade level. There were 30 classes whose sections were not reported by the observers (coded as 0). Ras made 158 observations and the independent observers made 180.

Conclusions drawn for individual items on the Observation Schedule itself are listed with an additional classification as being either support (S) or use (U) items in the following paragraphs:

1. (U) Between 10% and 50% of the computers in second, third, and fourth grade APS classrooms will be turned off during any unannounced observation in the weeks prior to the end of the school year.
2. (S) Between 10% and 50% of the storage areas for relevant computer manuals in APS second, third, and fourth grade classrooms will not be within reach of students.
3. (U) No dust will be obvious on computer desks in about 90% of the classrooms. Another way of making the statement is that about 10% of the classrooms will contain computer desks so little used that there will be perceptible dust on them.
4. (S) In more than 10% of the classrooms computer stations will not be equipped with enough chairs to facilitate use of each station.
5. (S) Viewing of the computer stations will be blocked in fewer than 10% of the classrooms.
6. (U) In between 10% and 50% of the classrooms, computer screens will show visible fingerprints.
7. (U) The observed data do not permit rejecting the hypothesis that in 10% of second, third, and fourth grade APS classrooms the furniture will be placed in positions not allowing reasonable computer accessibility.

8. (U) Between 50% and 90% of the classrooms presented no evidence that used computer paper was being salvaged for non-computer purposes.

9. (U) Between 50% and 90% of the software manuals maintained at the work stations had no perceptible use if use was indicated by dirty page edges.

10. (U) Further indication of lack of use was absence of dirt smudges, finger marks, highlightings, or underlinings on the pages of software manuals in between 50% and 90% of the classrooms.

11-14. (S) Observations made of second, third, and fourth grade APS classrooms indicated a serious lack of display of computing related materials on spaces usually considered optimal for display.

15. (U) The data also suggest that teachers were receiving only limited benefits, compared with potential benefits, from the computing power at their disposal for production of worksheets and handouts. On the average, only about 15% of the opportunities were reported to have been capitalized upon.

17-19. (S) The observed data do not permit rejecting the hypothesis that in 10% of second, third, and fourth grade APS classrooms Reading, Writing, and Mathematics software manuals were not maintained in the storage areas for computer manuals.

20. (S) Between 10% and 50% of the storage areas for computer manuals did not contain Language Arts Manuals.

21. (S) Between 50% and 90% of the storage areas for computer manuals did not contain Social Studies Manuals.

22. (S) Between 50% and 90% of the storage areas for computer manuals did not contain Science Manuals.

24. (S) The data are suggestive that about one in three teachers could not name their corresponding Josten's Consultant.

25. (S) In the present data about 40% (4 in 10) of the teachers told the observers they did not plan with the help of server reports!

26. (S) One hundred sixty-four teachers (of 338) claimed to receive server reports monthly or less often. Of the 164, 92 claimed not to receive server reports at all! One hundred twelve claimed to receive the reports at least weekly. Of the 112, 21 claimed to receive the reports more frequently than once per week.

27. (S) About 80% of the classroom teachers could not produce a "server report" however loosely interpreted. Furthermore, statistical hypotheses testing suggests between 50% and 90% of the teachers from all second, third, and fourth grade APS classrooms would not be able to produce anything when asked to show their server reports.

28. (U) On the average, observers noted about 1.5 students using the classroom computers during the observation sessions.

29. (U) The median of the average number of times each day students claimed to use computers was 1.0.

30-46. (U) Computers were probably used more at the end of the year for working math problems and less for writing reports than for writing stories or messages. The excerpt below shows the averages for activity in the week prior to observation (1=No, 2=Yes).

Average:	To Write a Story	To Write a Message	To Write a Report	To Work a Math Problem	To Use Computer More
Mean	1.438	1.393	1.169	1.721	1.845
Std	.410	.388	.292	.378	.328

In 264 of the 338 observations the three students interviewed were in complete agreement that the computer needs to be used more. In 38 of the cases they were in complete agreement that they did not want to use it more. In 29 of the observations 2 out of the 3 agreed to more use, and in 7 of the observations 2 out of the 3 agreed in not wanting to use it more.

Observers' Comments:

The best guess from the evidence collected from the Ras and the 6 independent observers is that in about 25% of the cases during the closing weeks of school, there would be no computing activities during the typical instructional day. At least some teachers would like to have had more assistance with applications of the computer in instruction. The server reports were a mystery to at least some teachers. Many teachers cited technical and reliability problems with equipment. For some students it was weeks between opportunities to use the computers. At least one student never used the computer. Some teachers did not

unpack materials from Josten's. A surprising number of teachers tended to deemphasize computing in the closing weeks of the academic year.

For more than a few observations it was noted that students must finish their work before they may use the computers. Such a rule speaks against the computer as an instructional tool except for the fastest students who are likely also to be the brightest.

The smallest non-standardized data alpha was .1514 for the two teacher items, the largest was .8595 for the 46 observation schedule instrument items. Neither scale will be used in the LISREL model, the first because the reliability is too low, and the second because it weighs too highly the 18 student items. Reliabilities on the other scales of interest for LISREL input range between .5573 for the 5 SERVER items to .7917 for the ITEMS_34 scale. ITEMS_34 was computed from the first 28 items and composites or aggregates for the 6 student items. The 5 means of student items (excluding the item for the times each day you use a computer) formed the additive scale named STUDAVGS with observed data alpha of .7440.

The reasonable summary position based on the foregoing conclusions is that teacher proficiencies intended as outcomes of JLC training of APS teachers cannot be substantiated by this study. Conversely, the findings and conclusions suggest that these proficiencies are not evidenced in the APS classroom computer environment with the teacher and the JLC consultant as critical components of this environment.

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APPENDICES

APPENDIX A

OBSERVATION SCHEDULE FOR COMPUTERS IN THE CLASSROOM ENVIRONMENT

OBSERVATION SCHEDULE FOR COMPUTERS IN THE CLASSROOM ENVIRONMENT

Instrument No. 77130-44715-4 **Atlanta Public Schools**

I. Physical Inferences at time of your arrival in the classroom.

Check Yes or No		Items
Yes	No	1. Are the computers turned on?
		2. Is the storage area for relevant computer manuals within reach of students when they are using computers?
		Estimate if the machines were recently used.
		3. Are computer desks dusty?
		4. Is there a chair at every computer station?
		5. Does anything block the view of computer screens?
		6. Are there visible fingerprints on the computer screens?
		7. Consider placement of the furniture in the classroom. Is the furniture
		7. Consider placement of the furniture in the classroom. Is the furniture placed to allow reasonable computer accessibility?
		8. Look around the classroom for evidence of computer paper ***with printing on it*** being used for non-computer purposes. Is there evidence?

II. Physical Inferences from the neighborhood of the computer stations.

Check Yes or No		Items
Yes	No	Estimate the degree of wear on software instruction manuals maintained at the work stations.
		9. Are page edges dirty?
		10. Are there dirt smudges, finger marks, highlightings or underlinings on some pages?

II. Physical Inferences from the neighborhood of the computer stations. (continued)

Percent	Item
	Estimate the *percent* of instructional display space dedicated to commercial or teacher-produced computing related topics. (Write your estimate. Leave blank for no display space.)
	11. Bulletin Board Space.
	12. Wall Space.
	Estimate the *percent* of instructional display space dedicated to the display of student work such as math, art or writing (i.e., letters, newsletters, reports) produced on the computer. (Write your estimate. Leave blank for no display space.)
	13. Bulletin Board Space.
	14. Wall Space.

III. Inferences from conversation with teacher:

Percent		Items
		15. What percent of the total number of worksheets/handouts produced by this teacher in the current academic year were produced by computer.
		16. Estimate the number of relevant software kits in this classroom the teacher could access.
Check Yes or No		**Ask to see the storage are for computer manuals. Check Yes or No indicating presence or absence of one or more manuals for teaching the subject matter.**
Yes	No	
		17. Reading?
		18. Writing?
		19. Mathematics?
		20. Language Arts?
		21. Social Studies?
		22. Science?

III. Inferences from conversation with teacher: (Continued)

	23. Ask to see the teacher's computer schedule with a timeframe for each student. From the schedule, is it your opinion that this teacher applied or intends to apply computing during the instructional activities of the day?
	24. Ask the teacher for the name of the Josten's Educational Consultant. Write the name on the blank line below. _____
	25. Ask: Do you use reports from the server to help with your instructional planning?
	26. Ask: How often do you receive reports from the server? Check one of the following:
	a. Daily?
	b. Two to four a week?
	c. Weekly
	d. Two-three a month?
	e. Monthly?
	f. Each grading period?
	g. Each semester?
	h. Not at all?
	27. Ask to see the latest server report. Write in the date of the report in the box on the left.

IV. Student Evidence:

Student A		Student B		Student C		Items	
						28.	What number of students did you see use computers during your observation?
Y	N	Y	N	Y	N	29.	Inferences from conversations with students. Please use the segment of the attached random number table to select three students (perhaps by row and position in row). For each selected student, ask questions permitting responses in the spaces provided on the left.
						a.	How many times each day do your use a computer?
						b.	Have you used a computer in the last week to write a story?
						c.	Have you used a computer in the last week to write a message, note or letter?
						d.	Have you used a computer in the last week to work an arithmetic problem?

V. Other Observations. Please use whatever space you need below and/or on the back of this sheet to add other evidence suggestive of the contributions made by computers to the educational program within the environment of the observed classroom.

USING A RANDOM NUMBER TABLE

A "Short Table of Random Numbers" is copied as an attachment. It should be used for selecting 3 students as requested for Item 25 in the instrument titled Observation Schedule for Computers in the Classroom Environment.

Assuming the need for three sets of two single-digit numbers each, one could proceed as follows:

1. Enter the table randomly, say by opening a book to a page. Use the last digit of the page number to establish the row of the random number table to enter. Information for a more serious, second entry into the table should be found in this row of the table.

2. Move across the row of the table from Step 1 until an adjacent pair of digits not larger than 25 is encountered. (If you arrive at the right edge of the table in following these directions move, as in reading, to the left edge one line down.) Note the numeric value of the pair of digits to establish a column number for use in your second entry into the random number table. Continue moving across the row to locate a second pair of digits, these being not larger than 50. Note their value to establish a row number for use in your second entry.

3. Remembering the 2 pairs of 2-digit numbers identified in the prior step (2 above), count the number of columns corresponding to the first pair across the random number table beginning at the left edge to enter the table a second time. Then move down from the top the number of rows corresponding to the second number identified in Step 2. There should be a 2-digit number at that column-row intersection. Note this 2-digit number for use in Step 4.

4. If it is not too large, the first digit of the last identified (Step 3) 2-digit number represents the number of the first criterion for selection of the first child, say the row criterion of the child. If it is too large, use the second digit. If neither are of the right size, move across the row toward the right as in normal reading until the first digit of the appropriate size is encountered. That number would establish a seating row for the first child.

5. Continue moving across the previously established table row toward the right until the number or digit is encountered that satisfies the second criterion, say for the position in the seating row for the first child. You now have satisfied the two criteria for selecting Child A for Item 25 on the instrument.

6. Without entering the table again, continue moving across the same row from the position for Child A to the right as described in the foregoing to satisfy first row then position in row number criteria for selecting the second child, B; then for selecting the third child, C.

Remember, if you arrive at the right edge of the table in following these directions move, as in reading, to the left edge one line down.

A Short Table of Random Numbers

A portion of a table of random numbers should be supplied here in place of this sheet as an attachment to the Observation Schedule. Such a short table is called for on the last page of the instrument and is used for the described process of randomly selecting three students in each classroom for interviewing.

APPENDIX B

Volunteered Observer Comments Based on Observations and Interactions With Teachers and Students

APPENDIX B

Volunteered Observer Comments Based on Observations and Interactions

With Teachers and Students

Obs	Comments
7	Teacher: "Computers are always down."
12	Students were not available.
13	Two students said "YUK" when asked how many times each week they used the computer.
20	Students and teacher were enthusiastic about sharing of progress.
24	If the teacher were able to take equipment home with her in order to make worksheets and various exercises, she would love to do so.
25	Teacher and students went to lunch.
26	Principal showed-off computer facilities and projects.
27	Students and teacher at lunch.
28	Were not available for discussion.
30	Were not available for discussion.
31	Career day--teachers and students unaccessible.
32	Classroom not available due to Career Day.
34	Substitute teacher.
35	Teacher does not use server reports. She prefers to do planning on her own. Children were very enthusiastic!!! The students were very excited about working on the computers. They simply love them.

(Continued on next page)

Appendix B continued

Obs	Comments
42	Substitute teacher.
45	Teacher and students not available.
47	Unable to get into the 2nd grade classrooms--everyone outside.
48	Career day--teachers and students not available.
49	Children out of room.
51	Students and teacher were very energetic.
52	The teacher . . . seemed very enthusiastc about the program, she felt, however, that there was not adequate funding for her school.
53	Students not available--computer stations very neat: organized. Bulletin boards--very creative using computer printout sheets. Very impressive! Teacher commented: "System stays down often. Technical problems--it was obvious however--that she uses the computers a great deal!"
56	Teacher and students not available.
57	Teacher and students not available.
58	Access denied.
59	Refused admittance because of Career Day.
60	Access denied.
61	Very enthusiastic about computer use by students and teacher, one home.
64	Teacher not available. Only 2 students available.
68	Children were very enthusiastic!

(Continued on next page)

Appendix B continued

Obs	Comments
73	Teacher and students not available.
74	Substitute teacher--students and teacher not in classroom.
75	Neither students nor teacher were really enthusiastic about computer work. There was no evidence of work products. Students claimed to use machines every 2 weeks, one time a week, and every other week.
76	Teacher knew nothing of server reports, etc.
77	Students also help in making worksheets--about 40%.
78	Students and teachers not available--field day.
79	Teacher really not comfortable with computer use--would like help.
80	Teacher and students not available due to field trip.
81	Teacher and students not available due to field day.
86	Josten's materials were still in unopened boxes. Students were engaged in writing original stories.
88	Everyone was at an assembly.
89	Everyone was at an assembly.
91	Students and teacher were unavailable.
92	Teacher was "busy", large bulletin boards were in front [blocking machines] students have to walk around, first student "never uses computer".
93	Software sits unopened on shelves.
97	Teacher looks at server report daily, yet doesn't print it out often. Very nice--receptive.

(Continued on next page)

Appendix B continued

Obs	Comments
100	They have packed up for the year. Keyboards and displays are still out, yet all disks and manuals are packed up! Teacher didn't seem too interested in computers, that tended to rub off on students. Obviously computers in her rooms were packed up 3 weeks before school was to be out and other teachers are still using theirs! Teacher doesn't know what/who server is.??
101	Keep computers . . . So software other than Josten's software will run . . .
102	Teacher was in a hurry to take class to practice for a show. she wasn't willing to take time to answer questions. Very unreceptive!
104	Students said that they do not follow the schedule. They must finish their work before they can work on the computer.
105	Computers being used but some were being cleaned by custodian!
106	Students can use computers after they finish other work.
107	Computers were not in use for two weeks.
110	[Server] Reports are supplied by Josten's representative.
111	Principal left school as we arrived and said she would return in 45 minutes. She returned an hour later and then asked us to wait. She had talked to Dr. Cobbs and voiced her complaint. She was not receptive.
112	Much [evidence of] use of computers throughout hallways.
113	Hall bulletin board full of student computer work. Josten's representative gives [server] reports.
114	Students and teachers outside at May Day.
115	Teacher enjoys computers and it shows in her students.

(Continued on next page)

Appendix B continued

Obs	Comments
116	Josten's representative gives [server] reports.
117	Class and teacher at May Day celebration.
118	Teacher and students not in classroom.
119	[Teacher] does lesson plans on computer. [Teacher] would like more [software] for problem solving. Third student was in Washington last week.
120	Teacher keeps her own record on each student's performance [rather than relying on reports from the server].
121	Josten's produces printouts [server reports].
122	May Day--Teacher unavailable.
123	May Day--Class at lunch outside. Teacher monitors students herself [rather than use server reports].
124	Computer is a reward for completed homework. Very receptive! Wants more computers!
125	Server reports are produced by Josten's consultant.
126	[Although] no use schedule was posted, use was frequent.
127	[Server reports were produced] Fridays by Josten's consultant, [but teacher] was not sure what . . . [A server report is].
129	[Assistance with instructional planning comes from] Mrs. Miller.
130	Students were taking a test in math.

(Continued on next page)

Appendix B continued

Obs	Comments
131	One computer station was blocked to accessibility by a TV set. Teacher said they've had lots of troubles [with system] lately and haven't gotten [server] reports in a while. Teacher doesn't seem too computer interested or worried about the troubles she has been having with not receiving reports. Consultant visits twice a month but does not always give a report. Students were very unsure of what to do on computers. No students were on the computers until I told the teacher I wanted to observe.
132	[Software instruction manuals were] boxed-up. [Server reports come from the Josten's consultant, Ms. McDaniel. Could not find a server report.
133	[Server reports come from the Josten's consultant, Ms. McDaniel].
134	[Displays were kept in] notebooks.
135	Could not produce server report so claim of receiving one each day is questionable. [Teacher claimed] 10 [software kits] boxed up.
136	[Software instruction manuals were] boxed up for the year. No server report printout comes up in Library [but] teacher views progress in Library. Scores come up for each student after each program.
137	[Server reports come from the Josten's] consultant.
138	[Server reports come from the Josten's] consultant 2 or 3 a month in response does not conform to the latest date of 12-89.
139	[Server reports are] printed in-house, but only after hours when computers are not in use. Seldom done. Students [are] not usually at computers in afternoon. Teacher stopped teaching and assigned students to computers during my stay.
141	Denson [helps with instructional planning].
142	Teacher generates computer [server] reports. Teacher had been pre-warned of visit.

(Continued on next page)

Appendix B continued

Obs	Comments
143	Teacher and students at lunch.
147	Teacher could not locate server report but gave date of 5/22/90.
148	[Server reports are produced] upon request. Teacher estimates [last server report was in] January, but couldn't produce.
149	Need: Reading comprehension social studies and science software. [Server reports come from the Josten's] consultant.
150	Josten's supplies [server] reports.
152	Teacher unavailable--observed in empty classroom.
153	Open-pod classroom--computers serving 3 maybe 4 sections--good access.
155	Josten's supplies [server] reports.
156	Josten's supplies [server] reports. Teacher does own reports, too.
157	Manuals had been put away for parents night. Josten's supplies [server] reports.
158	Josten's supplies [server] reports. Principal was negative on survey, but helpful.
161	Josten's supplies [server] reports. Computers were down server report was packed-up
162	Power outage. This was a substitute teacher who had been here for over a month.
163	Josten's computer not operating properly--would like to have it working--unit content not easily determined. Cannot get out of study module without rebooting computer.

(Continued on next page)

Appendix B continued

Obs	Comments
164	Consultant inconsistent with visits and with helping students. Received naps grant to fund additional software. Teacher was [too] rushed [to supply server report]. Principal very resistent and insulted she was not alerted. She introduced us as unannounced visitors.
165	Students said that since it is the end of the year that they were not using the computers very much. (Bedlam)
166	Teacher not in classroom. [Observations continued without the teacher.]
167	Teacher wishes she could access funds for purchasing additional software (i.e. Printshop) that would benefit school.
168	Teacher asked for follow-up workshop on computer use. Probably the best educational atmosphere found.
169	Teacher had some suggestions to improve usage of computers. Manuals were packed up. Entire class [were using computers during observation].
170	Teacher does not use server reports. Teacher was very uninterested and unhelpful.
171	Josten's supplies [server] reports.
172	Josten's supplies [server] reports. Teacher also generates reports. Network server has been stolen--but continuing to use computers.
173	No reports available due to computer failure. Computers are down on network portion.
174	Observation was done on morning of may day. Class very controlled and engaged in instructional activity, nevertheless.
176	Computer was down much of the time this year. Students had to score own tests. Class engaged in directed reading instruction during observation.

(Continued on next page)

Appendix B continued

Obs	Comments
177	Couldn't locate server report. Showed me non-dated student report generated on server. Stated "it's too late in year to ask for such information."
178	Not all students [are] listed [on the server report]. All [relevant software kits were] in storage.
179	Disks only [no manuals]. [Science computer manual] doesn't work [???]. Server is not operable yet.
180	Disks only [no manuals]. Attached are 2 [server reports] which a student gave me from a folder and he said they were the latest. A student knew more about Josten's than the teacher!
181	Disks only [no manuals]. Teacher didn't have any [server reports]. General: teacher does not use Josten's as intended.
182	Teacher could not find a server report. General: The only teacher thus far who seemed to understand how to incorporate computer instruction into her lessons.
183	Disks only [no manuals], [although teacher answered yes to use of reports with planning observer stated the response] should be no. When asked to see the server reports, I got a slip showing Ms. Brook's [the consultant's] visit. General: Teacher doesn't seem to understand the purpose of Josten's.
184	Disks only [no manuals]. [Josten's server reports] infrequently--if forced to answer--each semester. General: Teacher seems to barely understand purpose of Josten's.
185	Manuals were not at work stations. Not used by students once they learn how to use computer. Science software: Not easily accessible, need more server report is printed each Friday by consultant. Students [were] quite independent while working at computer station. Assist each other.

(Continued on next page)

Appendix B continued

Obs	Comments
186	Manuals were not maintained at work stations. Language Arts disks were part of reading and writing. Teacher was assigned to this grade section in March 1990. Students know a lot and can do work at computer stations independently. Teacher has much more to learn about system.
187	Manuals are not at work stations. About 1/3 of students can work independently with the computers]. Others need assistance from teacher, students or consultant. Teacher tried using a screen around computer stations to reduce distractions.
188	Manuals are not at work stations. All displays had been taken down.
189	Very attractive nook for computers with shelves for discs and manuals. Students do not have to refer to manuals, are trained by consultant. Students select discs, access software and use computers on own. Teacher makes use of mills correlations notebook. Wants to learn how to make own diskettes to reinforce certain skills.
190	Computer manuals have been taken from room or misplaced. Teacher reported in October 1989: Had an operating manual but no computer manuals. Has gotten 3 [server] reports this year. No server report was located. Near lunch time, students used computers prior to observation. Computers were off.
191	Apparently the 4th graders did not use the computers today. Teacher said some students tear up disks. Student B, asked what he did, said he played [on the computer].
192	Manuals were packed up.
193	APS or Josten's can be helpful. Software was not replaced in a timely manner. Scheduling may be a problem.
194	All software and manuals were packed up. Dr. Cobbs person was already in this school.

(Continued on next page)

Appendix B continued

Obs	Comments
195	Need to develop a lesson plan software package. Should be able to use "report card" instead of grade books. Easier to explain to parents.
198	Need more training on computers.
199	Kids enjoy computers. Need more reading disks. [Present] reading disks are monotonous.
200	[Kids] enjoy them. Have writing samples. Teacher enjoys them. They really help the kids. Need more software.
206	[This is] clearly a class where computers are used often and regularly.
208	[This is] clearly a class and school where computers are used extensively and regularly.
211	Teacher buys a lot of software on her own. Adds to Josten's. Children don't use manuals. Teacher would like software in area of social studies and science. The consultant is new to the school this year--service is poor. When consultant comes, she pulls it [server reports] off-- only once or twice a year do we get these reports. Frequently computers are off network--teachers have to boot non-Josten's software to use computers. "Labnet not active" is the message about half the time. Consultant [is] not knowledgeable--has not kept schedule for training this year at this school-- teachers know what they need. Want help on what they identify not on what consultant decides. Teacher is winding up end of year activities--not used computer as frequently this week.

(Continued on next page)

Appendix B continued

Obs	Comments
213	Display screens were cleaned this week. Children don't use manuals--only teacher does. Teacher doesn't feel comfortable with BankStreet--needs help. Correlations of skills (reading and math) with labnet software are complete and useful. Teacher had to redo the information. Teacher doesn't use science tool kit--doesn't understand. Need workshops on ibm only, not on apples. (IBM equipment used at grade 4 only--Prescription Learning uses applies at grades 2 and 3). Teacher doesn't understand BankStreet writer or pause. Consultant no help. Comes very infrequently. Consultant did 3 activities with children all year. Some math prescriptions work--some don't work (not generated). Consultant hasn't provided [help with instructional planning from server reports]. Teacher doesn't know how to generate it [server reports].
214	Children don't use manuals--only teacher does. Students have pendaflex folders that hold work. Teacher doesn't know how to generate it [server reports].
215	In fall the technician accidentally destroyed microtype disks. Josten's has not replaced all yet. Two or three computers do not print in classroom. Displays were cleaned this week. Manuals are too technical for children. Teacher explains. Student work is kept in notebooks, not on wall. Consultant usually doesn't know how to use software in order to help teachers--specifically ILA. Teacher needs more instruction on use of software. Software is too hard for children to use. Writing lab/writing task cards: cards not color coded correctly to disks. Report card: teacher doesn't know how to use--consultant hasn't helped--[consultant] never has time to help. Have one [science kit], don't know how to use--consultant not helpful. Consultant is only one to put in programs for prescription [server reports]. [There should be] emphasis on effective instructional technology--skills books--the match of skills to software [is] sometimes incomplete. Teacher has identified specific problems.
216	Teacher absent; therefore not available today. Walls were painted past weekend -- displays were removed. Students do not use manuals.

(Continued on next page)

Appendix B continued

Obs	Comments
217	Students do not use manuals. Children use instructions on disks. Most of work had been sent home.
218	Students do not use manuals. Have health tests on computer. Student pulled up story on BankStreet Writer for me to see. Student work is kept in notebooks.
219	Students were using the computer for writing--lots of student books were evident on the shelves. However, they have not been as active these past few weeks because of end of the year activities.
223	Printer has not operated all of 1st semester but is now working.
224	Instructions used by students are student disks.
225	Computers had been off all week. Someone removed terminator from main computer in library. Fixed Wednesday at 10:00. This is a class when students come and go to and from REP and Chapter I--list of names above each computer station. [I do not understand this comment.]
226	Three children on computer all said they were on cause they had finished their work at their desks. Student B: "Don't hardly go to computers."
227	No manuals at work station--not needed. Class was busy--2 students / computer --others working on other things.
228	Manuals were not available. Could not find server reports. I saw none. This teacher was watching 2 classes in side by side portables. She put 2 on each computer when I came in (none on computer since it first came up) said she usually puts 2 together.

(Continued on next page)

Appendix B continued

Obs	Comments
229	Printer is often broken.
230	No printer in class. Manuals are not used.
232	Ms. Johnson only allows her students on the computer when they have finished their work. None of the three students I picked used the computer last week.
233	(1) Computers fail to function at inopportune times. (2) Need an aide. (3) Computers very useful for review, drill, and practice, but nothing else.
234	Students did not use manuals. Materials packed.
235	Mrs. Welsh does not use consultant's [server] report. She produces her own.
237	Students need to get out of chairs to access computer manuals--they are not within reach. Teacher's comment: Directions are on the disk, usually. Quick reference and reference diskette unopened student work was kept in folders.
239	Schedules were posted but all students were scheduled at the same time for each of the 2 reading groups. Note: Student A commented that her class was so slow and worked at such a low-level that they didn't have much time to work on the computer. Teacher made almost identical comment. Children in class work at lowest level and hard to schedule them because of other classwork.
241	Teacher's comment: "it would be really good if teacher is permitted to take computers home over the summer" [for the purpose of preparing worksheets, etc.].
244	[Students are] already computer literate -- don't need manuals. Teachers comment. Student B: "did not use it [a computer] last week at all."

(Continued on next page)

Appendix B continued

Obs	Comments
248	BankStreet Writer was the only manual available nearby. Teacher reports that by now students know when to go to the microcomputers [therefore, a teacher's computer schedule is unnecessary]. Note: Teacher located me before I left the school and said she does receive reports sometimes. However, they are inaccurate because 5 students do not have their names in the system and have to key in on someone else's name. None [server report] available in brief visit (the teacher was going through stacks of reports to locate one, and I finally told her not to continue looking). Math and reading materials are sometimes at too low a level, so Teacher uses 3rd grade materials.
259	Student responses were "previous to down time."
261	Disk covers are dirty. Network is down [thus no teacher's computer schedule]. [Teacher] puts server report with weekly progress report that goes home with child.
266	Software jackets dirty, manuals not. [Reports received weekly but] old report, says this is the last one she got. Student A was absent. Students' work is displayed on the bulletin board.
267	Students were being prepared for GCRT and did not use Josten's during the last few weeks (2 months), to the extent they would have.
269	Class is making a school yearbook using the computer and made a Mother's Day book. Written work was evident all over the room but was not displayed. School is being closed. Teachers are already packing up.
270	System problems in school.
276	Teacher does not see consultant! Teacher said all students did math last week. This is an REP class of 4th graders. They use the Josten's materials, but the teacher does not receive any Josten's support and has not had training. Teacher did not attend workshop.
277	Labnet is down a lot.

(Continued on next page)

Appendix B continued

Obs	Comments
279	Schedule given verbally. Wall being painted so schedule not posted.
280	Displays had been removed for Literature Fair.
282	Student A: uses computer 1 time per month.
283	Received 1 report. Same name was used for multiple children.
284	This observer and teacher accepted (as did a number of other observer/teachers) the report half-page titled "Josten's Learning Consultant's Visitation" as a server report. This is a supply teacher who obviously does not allow the students to use the computer although she says she does. She was in this class the last 6 weeks of school.
285	Teacher reports computers help a lot, because of 3rd GCRT though don't get to use networked materials as much as she liked. Correlations were much better this year.
286	The school is about to be painted so everyone had removed materials from walls. A Literature Fair was going on so written materials had been collected and placed in books in the Media Center.
287	Last few weeks working on Bankstreet/Kidwriter not correlated to server. No server report last few weeks.
288	Computer displays were removed for Language Arts Festival.
289	Teacher had software manuals put away.

(Continued on next page)

Appendix B continued

Obs	Comments
290	Server reports: Lot of problems throughout year because student's names wouldn't come up. One server report for the year. Student C: Usually 2 times a day on Tuesdays only. Teacher would like to have more workshops. The man who came to service was very good to help us. Josten's consultant is always on time for lessons but all children wanted to work with him and got mad when he didn't have time to work with [all] of them.
292	Student A used computer less often than once per week. Had been on once this month (April). Teacher wishes everything could go to labnet beyond just prescriptions; otherwise, she loves the computers and thinks they're great.
293	Software manuals are in teacher's book bag. Teacher has already thrown server report away. It was run by consultant during 1st week of May.
294	Teacher says the computer helps a lot to reinforce skills. Children love it--"fight" to get on it.
300	Chairs had been put up over computer in preparation for cleaning crew.
301	Student B uses computer once per month.
303	Student C uses computer once per month.
307	Student C uses computer once per month.
309	New teacher--4 weeks. Teacher has not seen a server report. Teachers said this was too late in the year to be collecting reliable data. Suggest this data be taken [in] mid-year.
310	Teacher [could not produce server report because the teacher gave it] to students to use.

(Continued on next page)

Appendix B continued

Obs	Comments
312	[Software manuals were] packed up. Teacher had just 2 server reports this year.
314	[Software manuals were] packed up. Teacher never had a printout of student objectives. Classrooms are small. Computers are in a Center. There was 1 banner on the wall of the Center. Teachers are packing up for the end of the year.
316	Attached server report has no date.
317	Machines not on; student answers seemed slightly artificial--suggesting that they were telling me what they thought I wanted to hear.
319	Principal very rude and upset that we interrupted! Third grade had a substitute and I didn't ask her the questions. I only observed students and spoke with them.
320	("NGCOBO"--She had a card)[??????????].
323	Displays taken down for year.
324	Three students started using computers after it became clear that the computers were the reason I was present--they were on when I first arrived.
325	[Teacher was] too busy trying to "boot" computers that she couldn't look for it [the server report]. Also it was time for assembly. Computers weren't operating. Teacher trying to find problem.
326	Most computer manuals are stored in the other 4th grade section where the server is.
327	Teacher was very receptive to me. Teacher was very interested in students gaining computer knowledge! Wants more computers!!
329	All software is stored in case[????].

(Continued on next page)

Appendix B continued

Obs	Comments
330	The students use workbooks. Are these the same as manuals in 9 and 10? Displays have been taken down for painting.
331	One server report this year.
336	Two server reports were received early in year, none since. Teacher liked the workbooks and journal.